

MODULE 3 RIVERS AND STREAMS

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3.1.1

COPLANAR PCB IN FISH

Coplanar PCB in Fish

In 2001 the SWAT program was again integrated with the Dioxin Monitoring Program (DMP) that has been in effect since 1988. Fish samples collected at 21 DMP stations for dioxin analyses were also analyzed for coplanar PCBs in the SWAT program. All non-detects were calculated at half the detection limit. Dioxin toxic equivalents (DTEh) and coplanar PCB toxic equivalents (CTEh) were calculated using World Health Organization (1998) toxicity equivalency factors (TEFs). For comparison with the Bureau of Health (BOH) Fish Tissue Action Levels (FTAL) for protection of human consumers, the 95th upper confidence limits (95% UCL) were used. The 95%UCL DTEh are compared to the cancer action level, FTALc=1.5 ppt, and the 95%UCL TTEh (sum of both CTEh and DTEh) are compared to the reproductive and developmental action level, FTALr=1.8 ppt. For suckers from Veazie, Windham, and Westbrook, that were analyzed as whole fish, concentrations in filets were estimated for comparison with the Fish Tissue Action Levels. This was accomplished by dividing whole body concentrations by a factor of 3.5, determined from Androscoggin River suckers in the mid 1980's

The results show that DTEh in trout from the Androscoggin River at Gilead and the Kennebec River at Fairfield, eels from the commercial fishery in the Penobscot River at Orrington and suckers from the Androscoggin River at Rumford, Riley and Livermore Falls exceeded the FTALc (Figures 3.1.1, 3.1.2, 3.1.3). CTEh exceeded the FTALc in several samples. TTEh exceeded the FTALr in all fish sampled from the Androscoggin River and fish from many other stations as well documenting significant CTEh concentrations at many stations. CTEh concentrations were similar to those from 2000 at most stations. Mean coplanar PCB toxic equivalents (CTEh) varied in magnitude in relation to mean dioxin toxic equivalents (DTEh) as a percentage of total toxic equivalents (TTEh) (Table 3.1.1). DTEh were lowest at the reference stations at Norridgewock on the Kennebec River, Woodville on the Penobscot River, and in Androscoggin Lake and higher below known point sources. CTEh were not necessarily the lowest at the reference stations indicating some source in addition to or other than point sources, most likely atmospheric deposition at many stations.

SPECIES CODES

BNT	brown trout
EEL	eel
LMB	largemouth bass
RBT	rainbow trout
SMB	smallmouth bass
WHP	white perch
WHS	white sucker

STATION CODES

AGL Androscoggin R at Gilead
ARP Androscoggin R at Rumford Point
ARF Androscoggin R at Rumford
ARY Androscoggin R at Riley
AGI Androscoggin R at GIP, Auburn
ALV Androscoggin R at Livermore Falls
ALS Androscoggin R at Lisbon Falls
ALW Androscoggin Lake at Wayne
KRM Kennebec R at Madison
KNW Kennebec R at Norridgewock
KFF Kennebec R at Shawmut, Fairfield
KRS Kennebec R at Sidney
PBW Penobscot R at Woodville
PBM Penobscot R at Winn
PBL Penobscot R at S Lincoln
PBV Penobscot R at Veazie
PBO Penobscot R at Orrington
PWD Presumpscot R at Windham
PWB Presumpscot R at Westbrook
SFS Salmon Falls R at S. Berwick
SEN E Br Sebasticook at Newport
SED E Br Sebasticook at Detroit
SWP W Br Sebasticook at Palmyra

Figure 3.1.1.1 Coplanar PCB (CTEh) and dioxins (DTEh) in 2001 bass samples

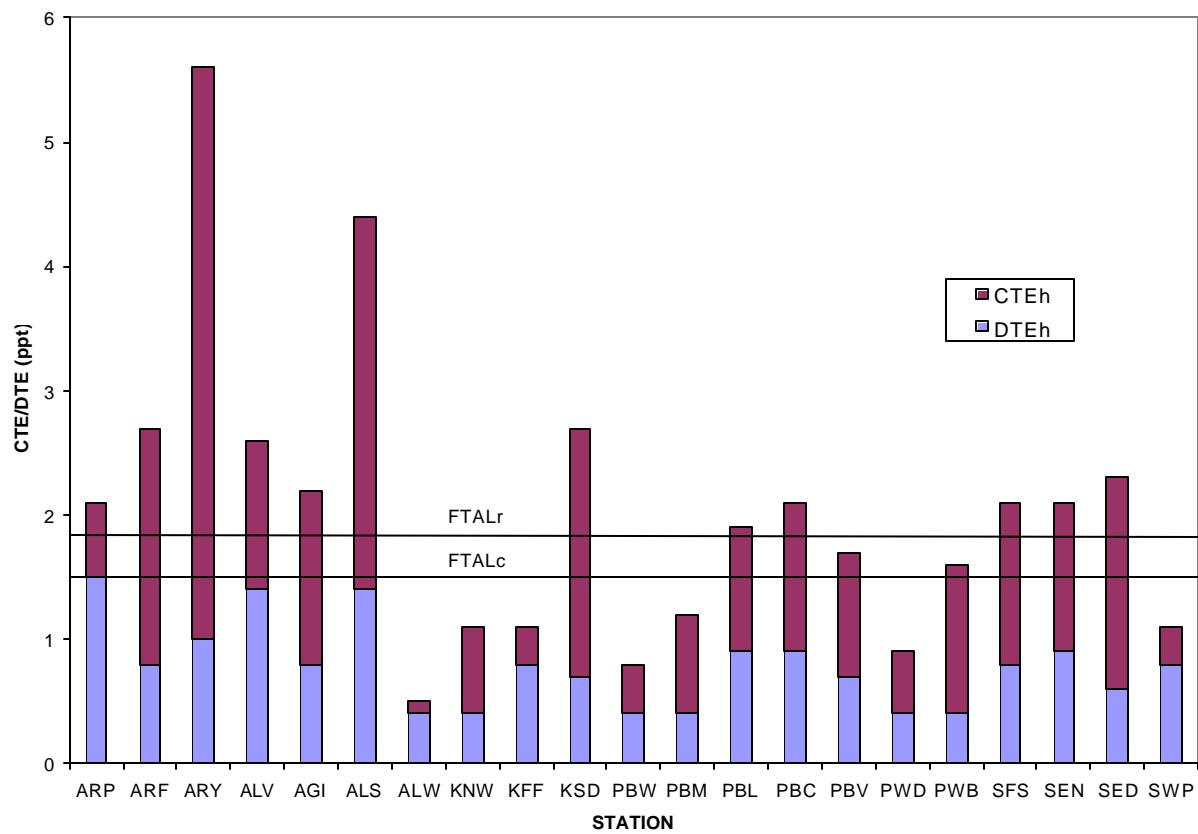


Figure 3.1.1.2 Coplanar PCB (CTEh) and dioxins (DTEh) in 2001 white sucker samples

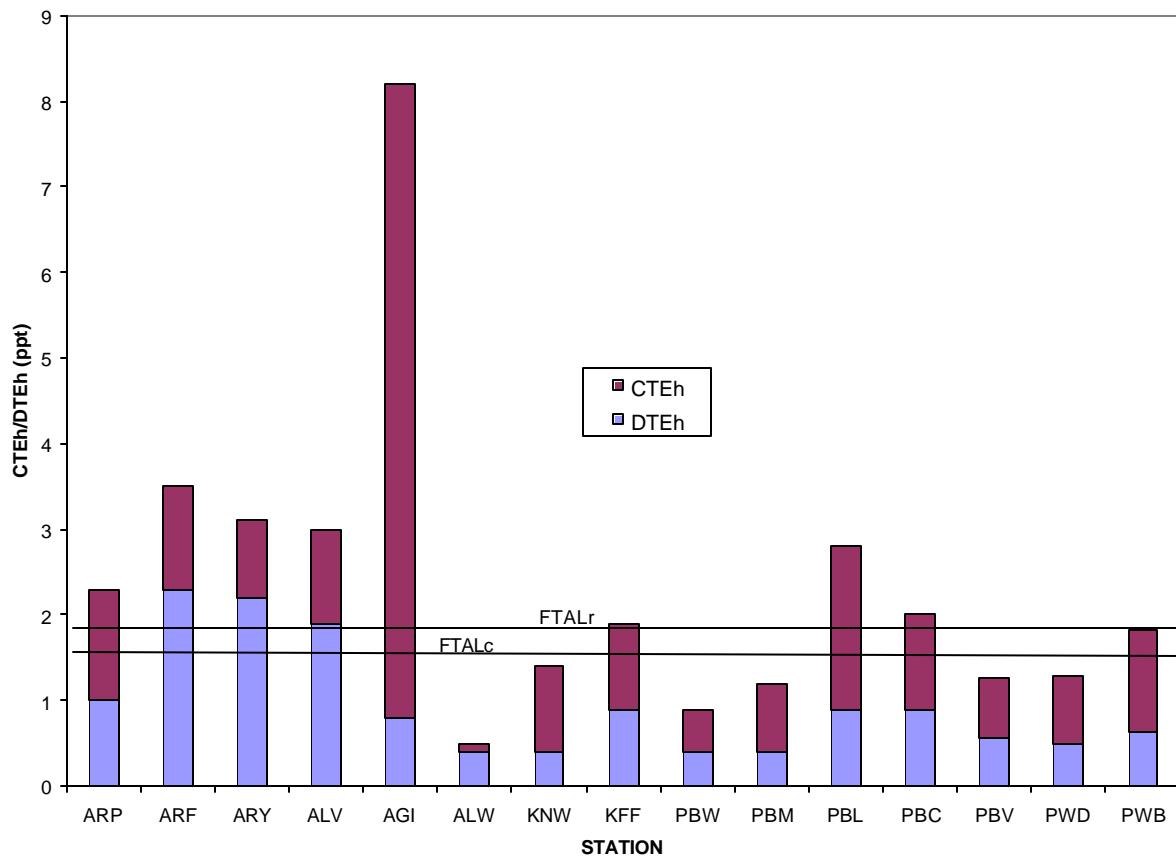
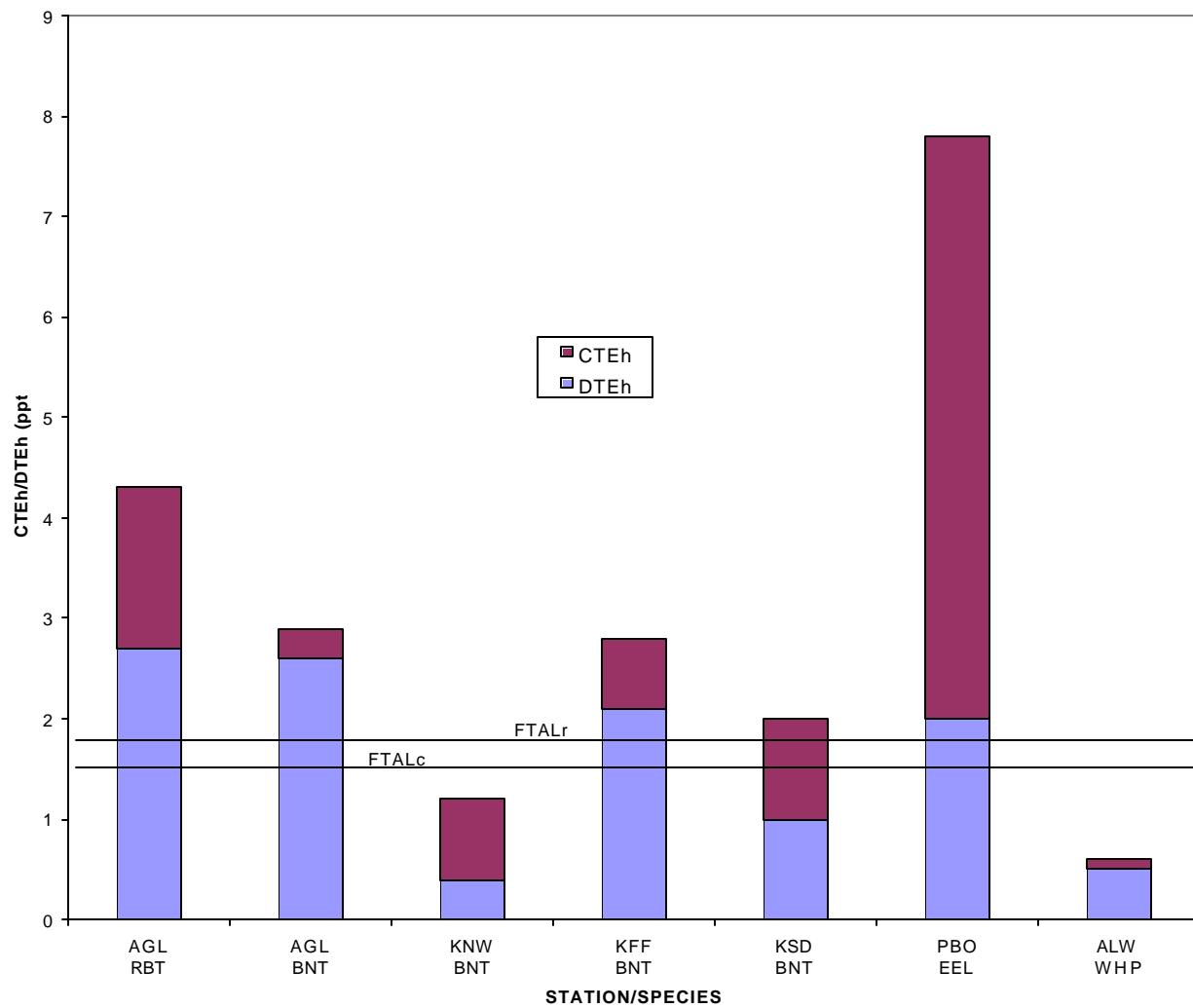


Figure 3.1.1.3 Coplanar PCB (CTEh) and dioxins (DTEh) in 2001 fish samples



DEP ID	IUPAC	DL	AGL-RBT-01	AGL-RBT-02	AGL-RBT-03	AGL-RBT-04	AGL-BNT-01
Congener	#	ng/kg					
3,3',4,4'-TCB	77	0.5	30.5	51.2	45.6	35.8	26.9
2',3,4,4',5-PeCB	123	0.5	26.8	48.9	41.2	37.7	3.66
2,3',4,4',5-PeCB	118	0.5	66.8	103	121	75.3	51.8
2,3,4,4',5-PeCB	114	0.5	24.6	41.6	38.5	28.7	21.5
2,3,3',4,4'-PeCB	105	0.5	18.4	31.4	29.7	22.2	4.58
3,3',4,4',5-PeCB	126	0.5	11.3	15.8	12.2	10.8	3.06
2,3',4,4',5,5'-HxCB	167	1.0	4.55	5.69	4.81	5.09	1.58
2,3,3',4,4',5-HxCB	156	1.0	102	198	169	88.5	33.6
2,3,3',4,4',5'-HxCB	157	1.0	2.26	2.69	2.47	2.55	0.55
3,3',4,4',5,5'-HxCB	169	1.0	1.03	2.25	1.87	1.48	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	21.7	40.2	35.9	30.6	7.01
CTEo			1.221	1.751	1.371	1.175	0.343
CTEd			1.221	1.751	1.371	1.175	0.353
% Lipids			1.96	3.61	3.06	2.19	10.22
Sample weight (g)			50.1	50.0	50.1	50.0	50.0

DEP ID	IUPAC	DL	ARP-SMB-01	ARP-SMB-02	ARP-SMB-03	ARP-SMB-04	ARP-SMB-05
Congener	#	ng/kg					
3,3',4,4'-TCB	77	0.5	8.07	22.3	25.9	30.8	7.89
2',3,4,4',5-PeCB	123	0.5	15.7	30.4	48.7	61.2	11.7
2,3',4,4',5-PeCB	118	0.5	105	269	288	324	95.6
2,3,4,4',5-PeCB	114	0.5	2.55	4.41	5.36	7.14	2.07
2,3,3',4,4'-PeCB	105	0.5	31.8	75.8	81.7	85.6	26.9
3,3',4,4',5-PeCB	126	0.5	1.78	2.69	3.91	4.58	1.33
2,3',4,4',5,5'-HxCB	167	1.0	2.56	5.88	7.01	7.25	2.04
2,3,3',4,4',5-HxCB	156	1.0	59.7	124	159	166	56.9
2,3,3',4,4',5'-HxCB	157	1.0	1.89	4.36	4.67	5.26	1.58
3,3',4,4',5,5'-HxCB	169	1.0	<DL	2.28	2.89	3.65	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	7.81	15.7	17.9	20.8	6.65
CTEo			0.227	0.400	0.551	0.636	0.178
CTEd			0.237	0.400	0.551	0.636	0.188
% Lipids			0.69	1.40	1.83	2.32	0.58
Sample weight (g)			50.1	50.1	50.1	50.0	50.1

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ's were calculated with estimated detection limits for these samples.

DEP ID	IUPAC	DL	ARP-WHS-C1	ARP-WHS-C2	ARF-WHS-C1	ARF-WHS-C2
Congener	#	ng/kg				
3,3',4,4'-TCB	77	0.5	31.4	26.9	18.7	15.9
2',3,4,4',5-PeCB	123	0.5	22.6	31.5	88.3	74.2
2,3',4,4',5-PeCB	118	0.5	124	133	441	399
2,3,4,4',5-PeCB	114	0.5	6.61	5.21	9.1	10.2
2,3,3',4,4'-PeCB	105	0.5	21.4	15.3	256	288
3,3',4,4',5-PeCB	126	0.5	11.2	8.51	10.1	8.15
2,3',4,4',5,5'-HxCB	167	1.0	5.47	4.26	35.8	29.8
2,3,3',4,4',5-HxCB	156	1.0	74.5	59.6	66.2	68.9
2,3,3',4,4',5'-HxCB	157	1.0	5.14	4.31	5.09	6.25
3,3',4,4',5,5'-HxCB	169	1.0	0.66	<DL	1.01	1.24
2,3,3',4,4',5,5'-HpCB	189	1.0	15.4	13.4	8.57	9.57
CTEo			1.191	0.908	1.142	0.949
CTEd			1.191	0.918	1.142	0.949
% Lipids			2.49	1.85	12.88	12.42
Sample weight (g)			50.0	50.1	50.1	50.1

DEP ID	IUPAC	DL	ARF-SMB-01	ARF-SMB-02	ARF-SMB-03	ARF-SMB-04	ARF-SMB-05
Congener	#	ng/kg					
3,3',4,4'-TCB	77	0.5	21.2	12.0	15.6	18.9	26.5
2',3,4,4',5-PeCB	123	0.5	30.6	12.7	18.4	22.5	40.2
2,3',4,4',5-PeCB	118	0.5	387	266	321	294	421
2,3,4,4',5-PeCB	114	0.5	6.98	4.14	5.84	5.57	7.16
2,3,3',4,4'-PeCB	105	0.5	38.2	21.5	26.9	31.6	45.2
3,3',4,4',5-PeCB	126	0.5	15.9	9.98	10.5	14.2	18.9
2,3',4,4',5,5'-HxCB	167	1.0	12.6	6.58	11.7	9.85	14.7
2,3,3',4,4',5-HxCB	156	1.0	147	75.2	124	94.7	155
2,3,3',4,4',5'-HxCB	157	1.0	12.9	7.01	8.47	10.3	11.2
3,3',4,4',5,5'-HxCB	169	1.0	3.02	1.55	1.89	2.26	3.99
2,3,3',4,4',5,5'-HpCB	189	1.0	17.4	9.58	13.3	15.1	20.1
CTEo			1.753	1.089	1.178	1.536	2.072
CTEd			1.753	1.089	1.178	1.536	2.072
% Lipids			1.23	0.70	1.12	1.19	1.62
Sample weight (g)			50.0	50.1	50.0	50.1	50.0

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ's were calculated with estimated detection limits for these samples.

DEP ID	IUPAC	DL	ARY SMB-01	ARY SMB-02	ARY SMB-03	ARY SMB-04	ARY SMB-05
Congener	#	ng/kg					
3,3',4,4'-TCB	77	0.5	52.6	15.6	39.2	41.2	35.8
2',3,4,4',5-PeCB	123	0.5	48.7	22.6	41.8	61.5	54.7
2,3',4,4',5-PeCB	118	0.5	326	198	321	412	355
2,3,4,4',5-PeCB	114	0.5	15.8	13.2	19.4	29.6	25.7
2,3,3',4,4'-PeCB	105	0.5	98.7	55.2	114	147	121
3,3',4,4',5-PeCB	126	0.5	48.6	21.7	40.2	53.8	42.3
2,3',4,4',5,5'-HxCB	167	1.0	31.0	16.9	28.7	45.7	36.9
2,3,3',4,4',5-HxCB	156	1.0	187	112	179	268	224
2,3,3',4,4',5'-HxCB	157	1.0	42.5	18.4	31.6	51.7	45.7
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	1.05	0.85
2,3,3',4,4',5,5'-HpCB	189	1.0	20.2	11.0	15.8	29.8	26.2
CTEo			5.038	2.272	4.188	5.635	4.446
CTEd			5.048	2.282	4.198	5.635	4.446
% Lipids			1.23	0.61	1.09	1.73	1.57
Sample weight (g)			50.1	50.1	50.1	50.1	50.1

DEP ID	IUPAC	DL	ARY SMB-06	ARY SMB-07	ARY SMB-08	ARY SMB-09	ARY SMB-10
Congener	#	ng/kg					
3,3',4,4'-TCB	77	0.5	30.1	25.8	32.6	19.4	37.6
2',3,4,4',5-PeCB	123	0.5	27.3	31.0	26.4	25.8	38.9
2,3',4,4',5-PeCB	118	0.5	256	188	221	274	301
2,3,4,4',5-PeCB	114	0.5	10.8	12.1	16.3	14.7	21.6
2,3,3',4,4'-PeCB	105	0.5	62.8	84.1	78.5	88.3	102
3,3',4,4',5-PeCB	126	0.5	35.6	28.9	31.4	35.8	39.7
2,3',4,4',5,5'-HxCB	167	1.0	20.2	16.6	23.8	29.7	33.6
2,3,3',4,4',5-HxCB	156	1.0	158	142	130	167	139
2,3,3',4,4',5'-HxCB	157	1.0	26.9	20.4	26.8	33.7	23.4
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	12.6	16.7	20.3	14.7	21.2
CTEo			3.697	3.012	3.265	3.730	4.112
CTEd			3.707	3.022	3.275	3.740	4.122
% Lipids			0.76	0.73	0.87	0.77	0.90
Sample weight (g)			50.0	50.0	50.1	50.0	50.0

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.

TEQ's were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	ARY-SSMB-01 **	ARY-SSMB-02	ARY-SSMB-03 **	ARY-SSMB-04 **	ARY-SSMB-05 **
3,3',4,4'-TCB	77	0.5	15.9	21.5	5.04	13.6	26.3
2',3,4,4',5-PeCB	123	0.5	14.3	26.9	18.1	12.5	24.6
2,3',4,4',5-PeCB	118	0.5	135	257	208	144	288
2,3,4,4',5-PeCB	114	0.5	5.98	12.6	3.66	6.09	11.6
2,3,3',4,4'-PeCB	105	0.5	29.6	48.2	30.4	22.5	57.8
3,3',4,4',5-PeCB	126	0.5	18.4	31.6	10.5	15.7	36.2
2,3',4,4',5,5'-HxCB	167	1.0	13.6	25.9	21.6	16.5	22.1
2,3,3',4,4',5-HxCB	156	1.0	102	155	51.5	131	185
2,3,3',4,4',5'-HxCB	157	1.0	11.6	21.4	6.02	5.24	26.4
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	8.22	12.7	6.62	11.9	16.2
CTEo			1.920	3.291	1.108	1.662	3.773
CTEd			1.940	3.301	1.138	1.692	3.783
% Lipids			1.84	2.69	0.49	1.71	4.01
Sample weight (g)			22.3	46.8	14.4	16.7	50.0

DEP ID Congener	IUPAC #	DL ng/kg	ARY-SSMB-06 **	ARY-SSMB-07 **	ARY-SSMB-08 **	ARY-SSMB-09 **	ARY-SSMB-10 **
3,3',4,4'-TCB	77	0.5	16.8	9.88	14.2	9.47	8.12
2',3,4,4',5-PeCB	123	0.5	12.6	9.17	15.8	8.56	7.54
2,3',4,4',5-PeCB	118	0.5	127	114	157	125	96.7
2,3,4,4',5-PeCB	114	0.5	8.69	5.75	5.41	7.26	4.47
2,3,3',4,4'-PeCB	105	0.5	52.3	32.7	23.9	41.4	28.9
3,3',4,4',5-PeCB	126	0.5	26.8	22.3	20.4	22.5	18.9
2,3',4,4',5,5'-HxCB	167	1.0	10.1	8.15	15.9	20.1	13.8
2,3,3',4,4',5-HxCB	156	1.0	87.6	75.2	89.6	63.9	72.5
2,3,3',4,4',5'-HxCB	157	1.0	15.4	7.61	10.2	8.85	6.24
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	9.23	6.89	5.17	5.36	4.08
CTEo			2.758	2.292	2.114	2.309	1.946
CTEd			2.778	2.312	2.134	2.339	1.976
% Lipids			2.64	2.25	4.09	3.91	4.06
Sample weight (g)			21.9	19.8	22.2	17.8	15.9

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
 TEQs were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	ARY-WHS-C1	ARY-WHS-C2	ARY-WHS-C3	ARY-WHS-C4	ARY-WHS-C5
3,3',4,4'-TCB	77	0.5	24.6	30.8	12.5	14.5	16.9
2',3,4,4',5-PeCB	123	0.5	87.9	148	78.4	92.4	88.6
2,3',4,4',5-PeCB	118	0.5	222	326	121	159	141
2,3,4,4',5-PeCB	114	0.5	3.89	10.8	2.69	4.41	3.69
2,3,3',4,4'-PeCB	105	0.5	55.4	75.9	31.5	41.5	33.6
3,3',4,4',5-PeCB	126	0.5	5.23	8.59	4.01	5.58	7.21
2,3',4,4',5,5'-HxCB	167	1.0	16.8	23.6	12.7	15.8	11.5
2,3,3',4,4',5-HxCB	156	1.0	158	201	88.5	101	97.3
2,3,3',4,4',5'-HxCB	157	1.0	13.1	15.7	6.39	7.16	12.4
3,3',4,4',5,5'-HxCB	169	1.0	6.46	8.15	3.35	2.08	6.19
2,3,3',4,4',5,5'-HpCB	189	1.0	12.8	15.6	8.14	7.35	9.94
CTEo			0.716	1.114	0.509	0.667	0.869
CTEd			0.716	1.114	0.509	0.667	0.869
% Lipids			3.69	5.12	2.40	2.85	2.84
Sample weight (g)			50.1	50.1	50.1	50.1	50

DEP ID Congener	IUPAC #	DL ng/kg	ARY-WHS-C6	ARY-WHS-C7	ARY-WHS-C8	ARY-WHS-C9	ARY-WHS-C10
3,3',4,4'-TCB	77	0.5	28.6	26.9	15.9	18.7	23.7
2',3,4,4',5-PeCB	123	0.5	157	125	104	127	143
2,3',4,4',5-PeCB	118	0.5	301	299	175	203	287
2,3,4,4',5-PeCB	114	0.5	8.85	8.51	2.91	3.87	11.6
2,3,3',4,4'-PeCB	105	0.5	64.5	57.8	38.9	47.2	69.4
3,3',4,4',5-PeCB	126	0.5	8.06	6.98	4.84	5.56	7.26
2,3',4,4',5,5'-HxCB	167	1.0	22.1	18.9	8.85	22.3	25.5
2,3,3',4,4',5-HxCB	156	1.0	189	169	152	187	194
2,3,3',4,4',5'-HxCB	157	1.0	17.5	11.5	10.6	14.8	15.1
3,3',4,4',5,5'-HxCB	169	1.0	7.57	4.25	7.75	8.02	7.26
2,3,3',4,4',5,5'-HpCB	189	1.0	12.9	5.10	8.85	13.5	16.0
CTEo			1.046	0.887	0.679	0.780	0.963
CTEd			1.046	0.887	0.679	0.780	0.963
% Lipids			4.20	4.99	3.40	3.37	4.20
Sample weight (g)			50.0	50.1	50.0	50.1	50.1

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
 TEQs were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	ALV-SMB-01	ALV-SMB-02	ALV-SMB-03	ALV-SMB-04	ALV-SMB-05
3,3',4,4'-TCB	77	0.5	7.32	31.8	9.95	13.8	7.75
2',3,4,4',5-PeCB	123	0.5	75.9	72.5	42.8	88.6	69.4
2,3',4,4',5-PeCB	118	0.5	560	298	188	392	287
2,3,4,4',5-PeCB	114	0.5	19.7	15.8	12.3	30.3	24.7
2,3,3',4,4'-PeCB	105	0.5	105	40.3	61.2	77.6	61.8
3,3',4,4',5-PeCB	126	0.5	4.25	8.58	6.59	14.2	12.2
2,3',4,4',5,5'-HxCB	167	1.0	6.94	12.7	8.75	16.9	13.4
2,3,3',4,4',5-HxCB	156	1.0	20.7	84.6	51.2	62.4	55.9
2,3,3',4,4',5'-HxCB	157	1.0	2.50	7.75	2.81	4.09	3.65
3,3',4,4',5,5'-HxCB	169	1.0	<DL	0.96	<DL	1.25	1.02
2,3,3',4,4',5,5'-HpCB	189	1.0	8.25	6.21	6.07	9.58	7.37
CTEo			0.522	0.967	0.723	1.539	1.316
CTEd			0.532	0.967	0.733	1.539	1.316
% Lipids			0.43	0.45	0.46	0.86	0.76
Sample weight (g)			50.1	50.0	50.0	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	ALV-SMB-06	ALV-SMB-07	ALV-SMB-08	ALV-SMB-09	ALV-SMB-10
3,3',4,4'-TCB	77	0.5	6.91	8.07	11.7	4.06	4.97
2',3,4,4',5-PeCB	123	0.5	52.8	45.5	91.4	39.8	35.2
2,3',4,4',5-PeCB	118	0.5	241	167	377	134	161
2,3,4,4',5-PeCB	114	0.5	20.6	14.7	26.9	7.04	8.69
2,3,3',4,4'-PeCB	105	0.5	50.0	21.1	84.7	23.6	29.7
3,3',4,4',5-PeCB	126	0.5	9.51	6.02	12.7	3.25	3.69
2,3',4,4',5,5'-HxCB	167	1.0	10.8	6.37	15.8	5.14	4.88
2,3,3',4,4',5-HxCB	156	1.0	47.5	17.9	35.9	9.14	10.3
2,3,3',4,4',5'-HxCB	157	1.0	2.97	1.85	3.36	1.16	1.25
3,3',4,4',5,5'-HxCB	169	1.0	0.88	<DL	1.14	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	7.02	5.14	8.41	4.25	5.09
CTEo			1.031	0.644	1.372	0.354	0.403
CTEd			1.031	0.654	1.372	0.364	0.413
% Lipids			0.61	0.44	0.78	0.19	0.25
Sample weight (g)			50.1	50.0	50.0	50.0	50.0

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ s were calculated with estimated detection limits for these samples.

DEP ID	IUPAC	DL	ALV-SSMB-01	ALV-SSMB-02	ALV-SSMB-03	ALV-SSMB-04	ALV-SSMB-05
Congener	#	ng/kg	**	**	**	**	**
3,3',4,4'-TCB	77	0.5	2.66	2.15	2.97	3.97	4.02
2',3,4,4',5-PeCB	123	0.5	14.5	10.2	16.8	16.4	20.1
2,3',4,4',5-PeCB	118	0.5	234	175	198	122	147
2,3,4,4',5-PeCB	114	0.5	22.5	24.8	15.9	24.4	20.1
2,3,3',4,4'-PeCB	105	0.5	47.9	226.9	31.7	25.2	28.9
3,3',4,4',5-PeCB	126	0.5	5.81	5.17	4.25	<DL	3.05
2,3',4,4',5,5'-HxCB	167	1.0	20.6	16.8	22.2	11.2	12.8
2,3,3',4,4',5-HxCB	156	1.0	51.8	52.4	61.6	34.5	42.1
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	6.91	7.75	8.24	5.46	7.89
CTE_o			0.649	0.598	0.490	0.047	0.357
CTE_d			0.680	0.629	0.521	0.228	0.389
% Lipids			3.41	3.25	3.27	5.53	1.98
Sample weight (g)			16.8	14.2	15.7	13.2	13.4

DEP ID	IUPAC	DL	ALV-SSMB-06	ALV-SSMB-07	ALV-SSMB-08	ALV-SSMB-09	ALV-SSMB-10
Congener	#	ng/kg	**	**	**	**	**
3,3',4,4'-TCB	77	0.5	3.22	4.98	5.19	4.21	3.55
2',3,4,4',5-PeCB	123	0.5	27.5	42.9	26.8	17.4	15.9
2,3',4,4',5-PeCB	118	0.5	189	201	106	124	155
2,3,4,4',5-PeCB	114	0.5	21.8	18.6	26.9	15.9	20.5
2,3,3',4,4'-PeCB	105	0.5	33.8	42.2	15.7	21.6	<DL
3,3',4,4',5-PeCB	126	0.5	<DL	2.99	<DL	<DL	<DL
2,3',4,4',5,5'-HxCB	167	1.0	15.2	9.01	8.14	10.2	<DL
2,3,3',4,4',5-HxCB	156	1.0	68.4	45.7	26.9	34.7	23.5
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	6.16	6.71	5.84	5.25	<DL
CTE_o			0.071	0.361	0.043	0.043	0.039
CTE_d			0.313	0.393	0.285	0.285	0.282
% Lipids			5.12	4.33	3.61	4.49	3.65
Sample weight (g)			10.5	12.4	9.5	9.0	6.9

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ s were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	ALV-WHS-C1	ALV-WHS-C2	ALV-WHS-C3	ALV-WHS-C4	ALV-WHS-C5
3,3',4,4'-TCB	77	0.5	31.2	36.9	33.7	41.2	27.4
2',3,4,4',5-PeCB	123	0.5	95.6	121	158	196	136
2,3',4,4',5-PeCB	118	0.5	268	298	326	425	275
2,3,4,4',5-PeCB	114	0.5	8.01	8.67	11.5	12.1	9.45
2,3,3',4,4'-PeCB	105	0.5	36.9	42.9	86.7	213	102
3,3',4,4',5-PeCB	126	0.5	5.02	6.65	7.91	13.7	6.33
2,3',4,4',5,5'-HxCB	167	1.0	3.66	4.81	15.4	20.6	12.5
2,3,3',4,4',5-HxCB	156	1.0	49.9	56.9	88.4	106	52.9
2,3,3',4,4',5'-HxCB	157	1.0	7.24	8.31	9.87	15.7	5.51
3,3',4,4',5,5'-HxCB	169	1.0	<DL	1.02	<DL	2.26	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	11.3	13.6	8.51	4.78	6.69
CTEo			0.579	0.763	0.907	1.548	0.722
CTEd			0.589	0.763	0.917	1.548	0.732
% Lipids			3.49	3.74	3.35	5.30	3.27
Sample weight (g)			50.1	50.0	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	ALV-WHS-C6	ALV-WHS-C7	ALV-WHS-C8	ALV-WHS-C9	ALV-WHS-C10
3,3',4,4'-TCB	77	0.5	38.1	26.7	28.9	35.7	48.9
2',3,4,4',5-PeCB	123	0.5	88.2	175	106	163	155
2,3',4,4',5-PeCB	118	0.5	231	306	281	315	361
2,3,4,4',5-PeCB	114	0.5	7.88	8.51	7.24	10.6	13.7
2,3,3',4,4'-PeCB	105	0.5	131	75.6	51.6	126	188
3,3',4,4',5-PeCB	126	0.5	5.81	5.24	4.26	12.6	11.7
2,3',4,4',5,5'-HxCB	167	1.0	6.23	10.8	5.91	9.51	18.9
2,3,3',4,4',5-HxCB	156	1.0	47.7	92.4	31.5	61.3	87.5
2,3,3',4,4',5'-HxCB	157	1.0	12.7	10.4	6.03	15.2	16.2
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	1.52
2,3,3',4,4',5,5'-HpCB	189	1.0	7.35	9.47	6.91	10.5	4.21
CTEo			0.665	0.639	0.496	1.369	1.320
CTEd			0.675	0.649	0.506	1.379	1.320
% Lipids			2.85	3.61	2.28	3.36	4.28
Sample weight (g)			50.1	50.0	50.0	50.1	50.1

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
 TEQs were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	AGI-SMB-01	AGI-SMB-02	AGI-SMB-03	AGI-SMB-04	AGI-SMB-05
3,3',4,4'-TCB	77	0.5	8.99	16.9	15.4	3.88	6.35
2',3,4,4',5-PeCB	123	0.5	65.7	120	124	26.3	55.2
2,3',4,4',5-PeCB	118	0.5	188	251	274	59.8	91.5
2,3,4,4',5-PeCB	114	0.5	39.7	64.7	59.8	12.4	20.4
2,3,3',4,4'-PeCB	105	0.5	26.9	55.2	49.3	11.7	19.8
3,3',4,4',5-PeCB	126	0.5	8.41	13.5	12.4	2.06	4.47
2,3',4,4',5,5'-HxCB	167	1.0	16.4	26.9	23.6	4.21	7.36
2,3,3',4,4',5-HxCB	156	1.0	88.5	166	174	33.6	62.5
2,3,3',4,4',5'-HxCB	157	1.0	25.3	51.2	40.2	8.97	15.4
3,3',4,4',5,5'-HxCB	169	1.0	1.85	3.06	2.65	<DL	1.12
2,3,3',4,4',5,5'-HpCB	189	1.0	6.69	8.51	7.26	7.57	10.3
CTEo			0.966	1.567	1.451	0.244	0.526
CTEd			0.966	1.567	1.451	0.254	0.526
% Lipids			0.55	0.89	0.71	0.21	0.32
Sample weight (g)			50.0	50.1	50.1	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	AGI-WHS-C1	AGI-WHS-C2	ALW-SMB-C1	ALW-SMB-C2
3,3',4,4'-TCB	77	0.5	9.16	10.2	6.89	7.45
2',3,4,4',5-PeCB	123	0.5	85.2	95.2	8.15	10.2
2,3',4,4',5-PeCB	118	0.5	142	133	41.8	56.9
2,3,4,4',5-PeCB	114	0.5	74.6	64.7	0.69	1.02
2,3,3',4,4'-PeCB	105	0.5	25.5	21.4	9.57	10.6
3,3',4,4',5-PeCB	126	0.5	53.1	66.2	<DL	<DL
2,3',4,4',5,5'-HxCB	167	1.0	23.4	31.6	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	105	124	15.5	18.7
2,3,3',4,4',5'-HxCB	157	1.0	54.2	63.8	6.24	7.75
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	5.58	6.35	4.41	6.25
CTEo			5.454	6.773	0.018	0.023
CTEd			5.464	6.783	0.078	0.083
% Lipids			1.03	1.11	1.07	1.15
Sample weight (g)			50.0	50.1	50.1	50.0

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ s were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	ALW-WHP-C1	ALW-WHP-C2	ALW-WHS-C1	ALW-WHS-C2
3,3',4,4'-TCB	77	0.5	2.02	1.55	4.22	6.52
2',3,4,4',5-PeCB	123	0.5	15.6	9.67	35.7	58.9
2,3',4,4',5-PeCB	118	0.5	41.8	38.2	31.2	78.4
2,3,4,4',5-PeCB	114	0.5	2.69	2.05	1.06	2.21
2,3,3',4,4'-PeCB	105	0.5	8.85	7.35	4.59	13.5
3,3',4,4',5-PeCB	126	0.5	0.55	<DL	<DL	<DL
2,3',4,4',5,5'-HxCB	167	1.0	2.25	1.36	5.59	10.2
2,3,3',4,4',5-HxCB	156	1.0	46.9	29.9	49.7	104
2,3,3',4,4',5'-HxCB	157	1.0	6.07	3.47	3.06	5.21
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	2.03	1.48	1.01	2.33
CTEo			0.090	0.024	0.035	0.072
CTEd			0.100	0.084	0.095	0.132
% Lipids			1.11	0.54	0.32	0.84
Sample weight (g)			50.0	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	ALS-SMB-01	ALS-SMB-02	ALS-SMB-03	ALS-SMB-04	ALS-SMB-05
3,3',4,4'-TCB	77	0.5	10.4	12.8	26.9	21.4	25.8
2',3,4,4',5-PeCB	123	0.5	28.7	31.8	84.2	61.3	66.9
2,3',4,4',5-PeCB	118	0.5	121	137	299	224	245
2,3,4,4',5-PeCB	114	0.5	13.8	11.9	26.8	18.7	21.4
2,3,3',4,4'-PeCB	105	0.5	26.9	38.7	84.7	61.3	75.3
3,3',4,4',5-PeCB	126	0.5	14.7	15.4	30.2	21.7	25.8
2,3',4,4',5,5'-HxCB	167	1.0	30.2	22.6	61.6	52.8	49.7
2,3,3',4,4',5-HxCB	156	1.0	147	114	287	203	253
2,3,3',4,4',5'-HxCB	157	1.0	12.6	8.96	24.1	15.6	20.1
3,3',4,4',5,5'-HxCB	169	1.0	1.14	1.14	2.54	1.74	2.26
2,3,3',4,4',5,5'-HpCB	189	1.0	18.7	26.5	36.9	21.1	26.9
CTEo			1.589	1.644	3.268	2.345	2.794
CTEd			1.589	1.644	3.268	2.345	2.794
% Lipids			0.35	0.32	0.89	0.65	0.70
Sample weight (g)			50.1	50.0	50.0	50.1	50.1

Values less than the established MDLs are to be considered estimated values.

** For sample weights below 40 grams the detection limits must be adjusted accordingly.
TEQ s were calculated with estimated detection limits for these samples.

DEP ID Congener	IUPAC #	DL ng/kg	KMD-BNT-1	KMD-BNT-2	KMD-BNT-3	KMD-BNT-4	KMD-BNT-5
3,3',4,4'-TCB	77	0.5	3.58	5.22	4.89	2.47	2.63
2',3,4,4',5-PeCB	123	0.5	3.55	3.36	2.88	3.06	1.59
2,3',4,4',5-PeCB	118	0.5	37.9	81.7	61.7	42.4	40.2
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	3.47	6.06	5.87	3.21	3.66
3,3',4,4',5-PeCB	126	0.5	5.7	7.22	6.39	4.35	3.88
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	88.3	141	102	72.6	55.3
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	2.06	3.61	2.23	2.87	1.55
2,3,3',4,4',5,5'-HpCB	189	1.0	9.24	20.2	17.4	12.6	8.57
CTEo			0.642	0.840	0.722	0.506	0.437
CTEd			0.642	0.841	0.722	0.507	0.438
% Lipids			2.89	4.27	3.38	2.69	2.17
Sample weight (g)			50.1	50.0	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg
3,3',4,4'-TCB	77	0.5
2',3,4,4',5-PeCB	123	0.5
2,3',4,4',5-PeCB	118	0.5
2,3,4,4',5-PeCB	114	0.5
2,3,3',4,4'-PeCB	105	0.5
3,3',4,4',5-PeCB	126	0.5
2,3',4,4',5,5'-HxCB	167	1.0
2,3,3',4,4',5-HxCB	156	1.0
2,3,3',4,4',5'-HxCB	157	1.0
3,3',4,4',5,5'-HxCB	169	1.0
2,3,3',4,4',5,5'-HpCB	189	1.0
CTEo		
CTEd		
% Lipids		
Sample weight (g)		

DEP ID Congener	IUPAC #	DL ng/kg	KNW-SMB-1	KNW-SMB-2	KNW-SMB-3	KNW-SMB-4	KNW-SMB-5
3,3',4,4'-TCB	77	0.5	1.98	2.27	3.55	2.06	5.91
2',3,4,4',5-PeCB	123	0.5	2.88	4.45	5.02	4.21	8.22
2,3',4,4',5-PeCB	118	0.5	16.9	26.7	38.9	21.5	46.5
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	1.87	2.08	3.67	2.66	5.69
3,3',4,4',5-PeCB	126	0.5	2.04	2.68	3.06	2.87	4.88
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	41.6	66.3	75.2	62.3	124
2,3,3',4,4',5-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	4.26	5.24	6.61	4.89	8.66
CTEo			0.228	0.305	0.349	0.322	0.557
CTEd			0.238	0.316	0.360	0.332	0.568
% Lipids			0.26	0.53	0.67	0.50	1.05
Sample weight (g)			50.0	50.0	50.1	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	KNW-SMB-6	KNW-SMB-7	KNW-SMB-8	KNW-SMB-9	KNW-SMB-10
3,3',4,4'-TCB	77	0.5	4.55	3.26	6.14	6.07	5.29
2',3,4,4',5-PeCB	123	0.5	9.47	4.74	11.3	9.36	8.27
2,3',4,4',5-PeCB	118	0.5	61.3	31.6	68.6	71.6	59.6
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	7.58	3.26	7.45	8.06	7.22
3,3',4,4',5-PeCB	126	0.5	6.21	2.87	6.98	7.25	7.36
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	108	68.9	132	141	117
2,3,3',4,4',5-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	9.85	7.25	11.9	10.6	9.38
CTEo			0.684	0.326	0.775	0.806	0.803
CTEd			0.695	0.337	0.785	0.817	0.814
% Lipids			1.06	0.63	1.11	0.88	0.84
Sample weight (g)			50.1	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	KNW-WHS-1	KNW-WHS-2	KNW-WHS-3	KNW-WHS-4	KNW-WHS-5
3,3',4,4'-TCB	77	0.5	5.98	9.45	15.4	10.1	13.6
2',3,4,4',5-PeCB	123	0.5	6.87	9.87	16.8	12.5	12.8
2,3',4,4',5-PeCB	118	0.5	69.8	94.7	155	121	134
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	4.25	8.73	13.5	8.35	11.6
3,3',4,4',5-PeCB	126	0.5	3.09	8.05	6.66	6.01	8.02
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	47.8	89.6	110	102	131
2,3,3',4,4',5-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	3.55	12.1	15.2	7.35	12.7
2,3,3',4,4',5,5'-HpCB	189	1.0	4.21	7.75	11.3	8.47	11.3
CTEo			0.378	0.984	0.894	0.742	1.013
CTEd			0.378	0.985	0.895	0.742	1.014
% Lipids			0.97	1.72	2.47	1.84	2.09
Sample weight (g)			50.1	50.1	50.1	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	KNW-WHS-6	KNW-WHS-7	KNW-WHS-8	KNW-WHS-9	KNW-WHS-10
3,3',4,4'-TCB	77	0.5	7.58	16.3	14.7	6.97	15.7
2',3,4,4',5-PeCB	123	0.5	11.2	17.2	16.1	7.84	13.2
2,3',4,4',5-PeCB	118	0.5	107	188	131	88.5	154
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	6.91	13.6	12.4	5.69	12.7
3,3',4,4',5-PeCB	126	0.5	4.27	8.38	7.39	3.33	9.57
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	75.6	121	118	66.7	125
2,3,3',4,4',5-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	5.24	13.7	14.3	7.01	15.2
2,3,3',4,4',5,5'-HpCB	189	1.0	6.17	12.5	12.0	7.12	11.0
CTEo			0.531	1.060	0.960	0.448	1.192
CTEd			0.532	1.061	0.960	0.449	1.193
% Lipids			1.65	2.92	2.54	1.45	2.10
Sample weight (g)			50.0	50.0	50.1	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	KFF-BNT-1	KFF-BNT-2	KFF-BNT-3	KFF-BNT-4	KFF-BNT-5
3,3',4,4'-TCB	77	0.5	3.24	3.98	2.04	1.87	1.91
2',3,4,4',5-PeCB	123	0.5	7.04	4.55	3.02	2.75	3.31
2,3',4,4',5-PeCB	118	0.5	94.2	81.4	52.7	41.2	75.6
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	5.24	2.71	3.36	2.48	3.06
3,3',4,4',5-PeCB	126	0.5	5.91	4.26	5.21	2.88	3.91
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	184	168	105	97.3	75.5
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	8.11	7.02	4.21	4.06	3.88
2,3,3',4,4',5,5'-HpCB	189	1.0	25.3	21.8	10.2	15.8	13.5
CTEo			0.778	0.592	0.623	0.384	0.477
CTEd			0.778	0.592	0.623	0.384	0.478
% Lipids			3.37	3.29	1.33	1.06	1.08
Sample weight (g)			50.0	50.0	50.1	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg
3,3',4,4'-TCB	77	0.5
2',3,4,4',5-PeCB	123	0.5
2,3',4,4',5-PeCB	118	0.5
2,3,4,4',5-PeCB	114	0.5
2,3,3',4,4'-PeCB	105	0.5
3,3',4,4',5-PeCB	126	0.5
2,3',4,4',5,5'-HxCB	167	1.0
2,3,3',4,4',5-HxCB	156	1.0
2,3,3',4,4',5'-HxCB	157	1.0
3,3',4,4',5,5'-HxCB	169	1.0
2,3,3',4,4',5,5'-HpCB	189	1.0
CTEo		
CTEd		
% Lipids		
Sample weight (g)		

DEP ID Congener	IUPAC #	DL ng/kg	KFF-SMB-1	KFF-SMB-2	KFF-SMB-3	KFF-SMB-4	KFF-SMB-5
3,3',4,4'-TCB	77	0.5	3.06	4.21	3.35	3.60	4.45
2',3,4,4',5-PeCB	123	0.5	7.14	8.59	8.87	9.58	11.6
2,3',4,4',5-PeCB	118	0.5	38.6	47.6	56.7	45.2	51.2
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	3.98	5.36	4.12	4.78	5.06
3,3',4,4',5-PeCB	126	0.5	2.69	2.87	1.99	2.06	3.39
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	48.3	61.4	51.3	54.9	68.7
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	1.57	1.99	2.06	1.66	2.32
2,3,3',4,4',5,5'-HpCB	189	1.0	6.67	8.31	7.92	7.21	9.06
CTEo			0.315	0.345	0.253	0.257	0.405
CTEd			0.316	0.346	0.254	0.258	0.405
% Lipids			0.57	0.60	0.58	0.62	0.67
Sample weight (g)			50.0	50.1	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	KFF-SMB-6	KFF-SMB-7	KFF-SMB-8	KFF-SMB-9	KFF-SMB-10
3,3',4,4'-TCB	77	0.5	4.06	2.37	3.81	2.54	3.58
2',3,4,4',5-PeCB	123	0.5	8.15	10.3	9.54	8.63	9.97
2,3',4,4',5-PeCB	118	0.5	51.2	31.6	45.5	38.7	48.2
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	5.06	2.25	3.87	3.62	4.47
3,3',4,4',5-PeCB	126	0.5	3.55	1.29	2.58	1.87	2.28
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	50.7	31.8	40.4	36.9	41.2
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	2.58	1.63	1.97	1.14	2.25
2,3,3',4,4',5,5'-HpCB	189	1.0	11.0	9.45	6.29	8.31	10.3
CTEo			0.414	0.167	0.305	0.223	0.279
CTEd			0.415	0.168	0.306	0.224	0.280
% Lipids			0.47	0.47	0.56	0.37	0.57
Sample weight (g)			50.0	50.0	50.0	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	KFF-WHS-1	KFF-WHS-2	KFF-WHS-3	KFF-WHS-4	KFF-WHS-5
3,3',4,4'-TCB	77	0.5	10.8	9.38	8.39	7.75	8.59
2',3,4,4',5-PeCB	123	0.5	9.59	8.47	7.44	6.03	7.58
2,3',4,4',5-PeCB	118	0.5	131	139	109	88.6	126
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	11.8	12.7	9.28	8.31	7.98
3,3',4,4',5-PeCB	126	0.5	9.41	8.58	7.31	6.92	8.26
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	114	118	102	81.4	121
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	8.57	9.02	7.38	7.91	9.47
2,3,3',4,4',5,5'-HpCB	189	1.0	13.6	14.1	10.6	8.23	12.6
CTEo			1.101	1.026	0.870	0.824	0.997
CTEd			1.102	1.026	0.871	0.824	0.998
% Lipids			2.92	2.79	2.61	1.99	2.48
Sample weight (g)			50.0	50.1	50.1	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	KFF-WHS-6	KFF-WHS-7	KFF-WHS-8	KFF-WHS-9	KFF-WHS-10
3,3',4,4'-TCB	77	0.5	8.02	7.26	6.99	8.11	11.8
2',3,4,4',5-PeCB	123	0.5	7.14	6.69	5.28	7.24	10.2
2,3',4,4',5-PeCB	118	0.5	91.3	72.3	69.7	101	124
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	7.21	6.09	5.58	7.23	10.6
3,3',4,4',5-PeCB	126	0.5	6.95	5.87	4.75	7.65	8.98
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	88.3	61.3	74.2	87.2	134
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	3.08	4.28	5.39	9.05	10.5
2,3,3',4,4',5,5'-HpCB	189	1.0	5.19	6.06	7.14	8.31	14.7
CTEo			0.782	0.670	0.575	0.912	1.087
CTEd			0.783	0.671	0.576	0.913	1.088
% Lipids			1.84	1.80	1.74	1.82	3.39
Sample weight (g)			50.1	50.0	50.0	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	KWL-BNT-1	KWL-BNT-2	KWL-BNT-3	KWL-BNT-4	KWL-BNT-5
3,3',4,4'-TCB	77	0.5	3.97	3.22	8.15	5.88	5.21
2',3,4,4',5-PeCB	123	0.5	2.58	2.09	17.3	4.28	10.2
2,3',4,4',5-PeCB	118	0.5	31.6	21.5	155	66.3	71.3
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	2.06	2.55	8.41	5.17	4.26
3,3',4,4',5-PeCB	126	0.5	3.15	1.69	10.2	4.69	5.04
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	35.6	31.6	175	81.2	71.3
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	3.15	2.35	13.6	6.33	6.69
2,3,3',4,4',5,5'-HpCB	189	1.0	8.84	7.35	18.4	15.9	9.05
CTEo			0.369	0.212	1.264	0.583	0.617
CTEd			0.370	0.213	1.265	0.583	0.617
% Lipids			1.00	0.45	1.89	2.87	1.25
Sample weight (g)			50.1	50.0	50.0	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	KSD-SMB-1	KSD-SMB-2	KSD-SMB-3	KSD-SMB-4	KSD-SMB-5
3,3',4,4'-TCB	77	0.5	7.69	8.95	10.5	13.4	12.6
2',3,4,4',5-PeCB	123	0.5	14.8	22.9	19.6	23.7	22.8
2,3',4,4',5-PeCB	118	0.5	195	222	267	302	268
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	7.25	10.9	11.8	12.8	11.5
3,3',4,4',5-PeCB	126	0.5	10.9	14.6	18.4	15.9	13.8
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	154	224	184	259	201
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	10.8	11.5	14.2	16.9	15.9
2,3,3',4,4',5,5'-HpCB	189	1.0	15.8	18.3	25.6	21.4	23.8
CTEo			1.299	1.715	2.107	1.926	1.673
CTEd			1.300	1.716	2.108	1.927	1.674
% Lipids			0.41	0.60	0.60	0.51	0.70
Sample weight (g)			50.0	50.0	50.0	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBW-SMB-1	PBW-SMB-2	PBW-SMB-3	PBW-SMB-4	PBW-SMB-8
3,3',4,4'-TCB	77	0.5	4.11	3.67	4.61	3.09	3.87
2',3,4,4',5-PeCB	123	0.5	6.29	4.58	5.91	5.22	4.71
2,3',4,4',5-PeCB	118	0.5	188	320	265	224	212
2,3,4,4',5-PeCB	114	0.5	1.27	<DL	0.88	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	5.68	6.93	4.89	3.72	3.06
3,3',4,4',5-PeCB	126	0.5	1.35	0.75	0.95	1.06	0.88
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	98.4	41.2	82.5	77.3	61.9
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	3.56	0.66	2.24	1.85	2.06
2,3,3',4,4',5,5'-HpCB	189	1.0	5.27	1.24	4.58	4.03	3.67
CTEo			0.241	0.136	0.188	0.187	0.162
CTEd			0.242	0.137	0.188	0.188	0.163
% Lipids			0.67	0.21	0.52	0.44	0.44
Sample weight (g)			50.1	50.0	50.1	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBW-SMB-11	PBW-SMB-12	PBW-SMB-13	PBW-SMB-14	PBW-SMB-15
3,3',4,4'-TCB	77	0.5	4.95	4.69	2.85	5.06	3.97
2',3,4,4',5-PeCB	123	0.5	5.67	4.93	3.06	8.97	5.92
2,3',4,4',5-PeCB	118	0.5	141	239	96.2	225	268
2,3,4,4',5-PeCB	114	0.5	1.98	<DL	<DL	1.54	0.75
2,3,3',4,4'-PeCB	105	0.5	4.35	4.02	2.69	7.26	6.26
3,3',4,4',5-PeCB	126	0.5	5.84	0.97	0.51	3.68	2.87
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	124	91.9	53.9	151	76.4
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	3.84	1.47	0.84	4.25	3.08
2,3,3',4,4',5,5'-HpCB	189	1.0	6.02	4.91	1.02	5.49	5.06
CTEo			0.702	0.183	0.097	0.512	0.385
CTEd			0.702	0.184	0.098	0.512	0.386
% Lipids			0.82	0.49	0.18	0.82	0.58
Sample weight (g)			50.1	50.1	50.1	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBW-WHS-3	PBW-WHS-4	PBW-WHS-7	PBW-WHS-14	PBW-WHS-15
3,3',4,4'-TCB	77	0.5	7.66	13.5	8.47	6.94	3.26
2',3,4,4',5-PeCB	123	0.5	4.32	20.1	6.28	8.55	1.21
2,3',4,4',5-PeCB	118	0.5	127	159	139	167	101
2,3,4,4',5-PeCB	114	0.5	<DL	5.80	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	3.69	30.9	4.28	5.29	3.38
3,3',4,4',5-PeCB	126	0.5	1.15	1.75	1.33	4.01	1.06
2,3',4,4',5,5'-HxCB	167	1.0	<DL	6.44	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	58.9	42.4	88.5	126	35.6
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	4.61	11.5	5.87	8.55	4.26
2,3,3',4,4',5,5'-HpCB	189	1.0	3.35	4.19	3.98	6.32	2.85
CTEo			0.205	0.337	0.252	0.569	0.178
CTEd			0.206	0.337	0.253	0.570	0.178
% Lipids			1.43	1.92	1.62	2.84	1.31
Sample weight (g)			50.0	50.0	50.1	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBW-WHS-18	PBW-WHS-19	PBW-WHS-24	PBW-WHS-27	PBW-WHS-28
3,3',4,4'-TCB	77	0.5	4.75	5.02	7.39	9.51	7.47
2',3,4,4',5-PeCB	123	0.5	5.29	5.88	7.36	10.5	8.71
2,3',4,4',5-PeCB	118	0.5	154	187	220	297	154
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	1.47	3.19	<DL
2,3,3',4,4'-PeCB	105	0.5	15.2	4.79	6.02	8.59	4.44
3,3',4,4',5-PeCB	126	0.5	2.21	2.65	3.91	4.75	2.27
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	1.06	2.24	<DL
2,3,3',4,4',5-HxCB	156	1.0	71.5	90.3	145	188	101
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	5.78	6.22	7.48	11.6	4.89
2,3,3',4,4',5,5'-HpCB	189	1.0	3.47	2.87	5.61	9.06	3.57
CTEo			0.333	0.393	0.564	0.720	0.344
CTEd			0.334	0.394	0.564	0.721	0.345
% Lipids			1.66	1.70	2.40	3.41	1.77
Sample weight (g)			50.1	50.0	50.1	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBM-SMB-1	PBM-SMB-2	PBM-SMB-3	PBM-SMB-4	PBM-SMB-5
3,3',4,4'-TCB	77	0.5	70.2	53.9	85.1	71.5	81.3
2',3,4,4',5-PeCB	123	0.5	58.3	35.7	40.4	51.2	30.6
2,3',4,4',5-PeCB	118	0.5	134	93.1	268	206	158
2,3,4,4',5-PeCB	114	0.5	12.3	7.55	11.2	9.78	3.75
2,3,3',4,4'-PeCB	105	0.5	48.1	41.2	66.8	55.6	39.8
3,3',4,4',5-PeCB	126	0.5	9.97	5.97	6.63	7.21	5.26
2,3',4,4',5,5'-HxCB	167	1.0	5.64	3.51	2.25	4.97	3.99
2,3,3',4,4',5-HxCB	156	1.0	136	74.2	87.4	106	91.2
2,3,3',4,4',5'-HxCB	157	1.0	16.4	9.59	11.7	9.51	8.54
3,3',4,4',5,5'-HxCB	169	1.0	8.52	5.22	6.02	4.36	5.01
2,3,3',4,4',5,5'-HpCB	189	1.0	33.10	25.6	27.3	21.1	18.7
CTEo			1.199	0.720	0.827	0.868	0.661
CTEd			1.199	0.720	0.827	0.868	0.661
% Lipids			0.42	0.34	0.81	0.60	0.55
Sample weight (g)			50.1	50.0	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PBM-SMB-6	PBM-SMB-7	PBM-SMB-8	PBM-SMB-9	PBM-SMB-10
3,3',4,4'-TCB	77	0.5	94.2	48.7	41.2	53.8	46.7
2',3,4,4',5-PeCB	123	0.5	37.8	28.5	21.4	31.7	27.7
2,3',4,4',5-PeCB	118	0.5	187	88.5	75.2	91.7	78.3
2,3,4,4',5-PeCB	114	0.5	4.69	2.87	<DL	1.55	3.21
2,3,3',4,4'-PeCB	105	0.5	65.5	46.8	35.2	41.7	39.4
3,3',4,4',5-PeCB	126	0.5	6.25	4.21	3.14	4.57	2.95
2,3',4,4',5,5'-HxCB	167	1.0	2.64	1.25	<DL	1.97	0.98
2,3,3',4,4',5-HxCB	156	1.0	98.6	45.8	21.4	29.8	32.5
2,3,3',4,4',5'-HxCB	157	1.0	4.58	3.66	<DL	5.10	2.25
3,3',4,4',5,5'-HxCB	169	1.0	3.68	4.29	2.58	5.61	4.78
2,3,3',4,4',5,5'-HpCB	189	1.0	11.3	8.51	6.39	7.27	6.69
CTEo			0.755	0.512	0.368	0.554	0.382
CTEd			0.755	0.512	0.369	0.554	0.382
% Lipids			0.65	0.37	0.24	0.35	0.32
Sample weight (g)			50.1	50.1	50.1	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PBM-WHS-1	PBM-WHS-5	PBM-WHS-10	PBM-WHS-11	PBM-WHS-14
3,3',4,4'-TCB	77	0.5	5.29	11.1	6.80	7.21	10.2
2',3,4,4',5-PeCB	123	0.5	4.59	12.8	6.97	6.96	7.32
2,3',4,4',5-PeCB	118	0.5	88.5	118	52.5	121	141
2,3,4,4',5-PeCB	114	0.5	<DL	4.34	2.08	<DL	1.59
2,3,3',4,4'-PeCB	105	0.5	11.3	25.2	12.8	14.3	25.8
3,3',4,4',5-PeCB	126	0.5	3.34	6.19	4.26	5.84	6.65
2,3',4,4',5,5'-HxCB	167	1.0	<DL	3.19	3.82	<DL	1.54
2,3,3',4,4',5-HxCB	156	1.0	88.5	185	93.6	124	138
2,3,3',4,4',5'-HxCB	157	1.0	<DL	1.15	<DL	<DL	2.06
3,3',4,4',5,5'-HxCB	169	1.0	3.59	4.53	2.22	3.44	5.89
2,3,3',4,4',5,5'-HpCB	189	1.0	4.59	6.69	3.45	6.21	7.57
CTEo			0.426	0.777	0.504	0.696	0.814
CTEd			0.426	0.777	0.505	0.697	0.814
% Lipids			1.16	2.36	1.37	1.83	2.73
Sample weight (g)			50.1	50.1	50.0	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg
3,3',4,4'-TCB	77	0.5
2',3,4,4',5-PeCB	123	0.5
2,3',4,4',5-PeCB	118	0.5
2,3,4,4',5-PeCB	114	0.5
2,3,3',4,4'-PeCB	105	0.5
3,3',4,4',5-PeCB	126	0.5
2,3',4,4',5,5'-HxCB	167	1.0
2,3,3',4,4',5-HxCB	156	1.0
2,3,3',4,4',5'-HxCB	157	1.0
3,3',4,4',5,5'-HxCB	169	1.0
2,3,3',4,4',5,5'-HpCB	189	1.0
CTEo		
CTEd		
% Lipids		
Sample weight (g)		

DEP ID Congener	IUPAC #	DL ng/kg	PBL-SMB-1	PBL-SMB-7	PBL-SMB-8	PBL-SMB-12	PBL-SMB-13
3,3',4,4'-TCB	77	0.5	15.4	31.9	28.4	18.7	12.3
2',3,4,4',5-PeCB	123	0.5	11.3	23.8	21.1	16.9	10.2
2,3',4,4',5-PeCB	118	0.5	157	162	189	124	223
2,3,4,4',5-PeCB	114	0.5	<DL	7.51	2.47	<DL	1.58
2,3,3',4,4'-PeCB	105	0.5	10.3	38.3	18.7	15.3	21.3
3,3',4,4',5-PeCB	126	0.5	7.61	9.51	8.97	8.21	7.69
2,3',4,4',5,5'-HxCB	167	1.0	<DL	5.45	1.29	<DL	0.85
2,3,3',4,4',5-HxCB	156	1.0	141	102	201	195	173
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	5.58	7.47	9.47	8.57	9.06
2,3,3',4,4',5,5'-HpCB	189	1.0	4.98	4.50	7.65	6.69	8.02
CTEo			0.907	1.107	1.120	1.022	0.974
CTEd			0.908	1.107	1.120	1.023	0.975
% Lipids			0.76	1.02	1.05	0.96	1.03
Sample weight (g)			50.1	50.1	50.0	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBL-SMB-14	PBL-SMB-15	PBL-SMB-16	PBL-SMB-18	PBL-SMB-19
3,3',4,4'-TCB	77	0.5	8.55	5.22	6.31	7.59	11.6
2',3,4,4',5-PeCB	123	0.5	9.61	4.31	8.45	6.84	13.3
2,3',4,4',5-PeCB	118	0.5	137	98.5	141	112	159
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	0.75
2,3,3',4,4'-PeCB	105	0.5	11.9	5.15	6.95	7.36	8.68
3,3',4,4',5-PeCB	126	0.5	7.99	5.23	6.78	6.94	8.06
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	<DL	1.02
2,3,3',4,4',5-HxCB	156	1.0	144	85.6	157	131	163
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	8.14	5.21	10.3	7.75	8.51
2,3,3',4,4',5,5'-HpCB	189	1.0	5.92	4.02	8.57	4.75	7.98
CTEo			0.970	0.630	0.877	0.851	0.993
CTEd			0.970	0.630	0.877	0.852	0.994
% Lipids			0.87	0.38	0.73	0.58	0.91
Sample weight (g)			50.0	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PBL-WHS-3	PBL-WHS-10	PBL-WHS-12	PBL-WHS-13	PBL-WHS-14
3,3',4,4'-TCB	77	0.5	8.86	4.91	7.49	4.22	6.31
2',3,4,4',5-PeCB	123	0.5	9.19	5.69	9.47	6.31	8.24
2,3',4,4',5-PeCB	118	0.5	66.8	75.9	114	85.6	138
2,3,4,4',5-PeCB	114	0.5	3.48	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	16.5	7.31	13.4	3.87	9.61
3,3',4,4',5-PeCB	126	0.5	20.9	11.6	18.9	9.47	13.8
2,3',4,4',5,5'-HxCB	167	1.0	3.32	<DL	2.07	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	61.1	74.2	158	104	135
2,3,3',4,4',5'-HxCB	157	1.0	1.34	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	8.57	5.79	12.7	6.39	8.14
2,3,3',4,4',5,5'-HpCB	189	1.0	11.2	8.39	10.5	8.47	10.2
CTEo			2.220	1.265	2.112	1.074	1.546
CTEd			2.220	1.266	2.112	1.075	1.547
% Lipids			3.64	1.94	3.37	1.99	2.90
Sample weight (g)			50.0	50.0	50.1	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBL-WHS-15	PBL-WHS-20	PBL-WHS-21	PBL-WHS-22	PBL-WHS-23
3,3',4,4'-TCB	77	0.5	8.51	4.59	3.48	5.66	9.25
2',3,4,4',5-PeCB	123	0.5	10.2	6.48	4.47	5.01	11.6
2,3',4,4',5-PeCB	118	0.5	131	124	75.2	99.4	159
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	2.51
2,3,3',4,4'-PeCB	105	0.5	12.5	8.46	5.78	9.97	18.9
3,3',4,4',5-PeCB	126	0.5	10.3	10.4	8.85	15.6	21.5
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	<DL	1.14	2.55
2,3,3',4,4',5-HxCB	156	1.0	161	98.7	55.6	124	143
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	13.0	7.45	5.38	8.44	13.9
2,3,3',4,4',5,5'-HpCB	189	1.0	11.7	5.81	4.69	6.23	15.8
CTEo			1.258	1.179	0.976	1.719	2.383
CTEd			1.259	1.180	0.977	1.720	2.384
% Lipids			4.39	2.08	1.52	2.36	4.43
Sample weight (g)			50.0	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PBC-SMB-2	PBC-SMB-6	PBC-SMB-7	PBC-SMB-11	PBC-SMB-19
3,3',4,4'-TCB	77	0.5	5.86	6.28	7.14	7.94	8.79
2',3,4,4',5-PeCB	123	0.5	10.9	3.67	5.28	6.05	7.59
2,3',4,4',5-PeCB	118	0.5	78.2	101	124	88.5	224
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	2.89
2,3,3',4,4'-PeCB	105	0.5	18.6	6.95	8.97	11.5	13.2
3,3',4,4',5-PeCB	126	0.5	5.02	7.71	6.39	7.28	11.8
2,3',4,4',5,5'-HxCB	167	1.0	2.5	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	49.3	69.8	102	154	169
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	4.12	5.70	8.54	7.26	8.48
2,3,3',4,4',5,5'-HpCB	189	1.0	16.1	10.20	12.70	13.80	15.3
CTEo			0.581	0.876	0.791	0.890	1.378
CTEd			0.582	0.876	0.792	0.891	1.378
% Lipids			0.49	0.54	0.63	0.65	1.25
Sample weight (g)			50.0	50.1	50.1	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBC-WHS-2	PBC-WHS-5	PBC-WHS-6	PBC-WHS-7	PBC-WHS-13
3,3',4,4'-TCB	77	0.5	3.46	6.97	5.94	1.57	4.22
2',3,4,4',5-PeCB	123	0.5	37.8	4.29	5.29	2.26	8.35
2,3',4,4',5-PeCB	118	0.5	250	211	179	101	154
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	6.42	8.91	12.4	4.59	5.25
3,3',4,4',5-PeCB	126	0.5	9.45	7.61	8.48	4.06	5.88
2,3',4,4',5,5'-HxCB	167	1.0	1.53	<DL	1.89	<DL	1.38
2,3,3',4,4',5-HxCB	156	1.0	45.6	108	123	35.8	88.9
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	11.3	9.95	11.4	6.21	10.4
2,3,3',4,4',5,5'-HpCB	189	1.0	7.41	8.31	15.7	3.18	12.8
CTEo			1.111	0.938	1.045	0.497	0.755
CTEd			1.112	0.939	1.046	0.498	0.756
% Lipids			1.60	2.46	2.91	0.47	1.72
Sample weight (g)			50.0	50.1	50.0	50.1	50.0

DEP ID Congener	IUPAC #	DL ng/kg	PBV-SMB-9	PBV-SMB-12	PBV-SMB-17	PBV-SMB-18	PBV-SMB-19
3,3',4,4'-TCB	77	0.5	19.6	15.7	19.6	10.2	12.6
2',3,4,4',5-PeCB	123	0.5	17.8	16.3	30.8	8.95	11.3
2,3',4,4',5-PeCB	118	0.5	180	175	345	114	201
2,3,4,4',5-PeCB	114	0.5	6.12	<DL	1.23	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	4.02	10.5	7.27	3.68	5.02
3,3',4,4',5-PeCB	126	0.5	5.33	10.2	7.12	4.58	4.62
2,3',4,4',5,5'-HxCB	167	1.0	1.52	<DL	<DL	<DL	<DL
2,3,3',4,4',5-HxCB	156	1.0	39.9	187	82.1	49.7	64.7
2,3,3',4,4',5'-HxCB	157	1.0	1.01	<DL	1.79	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	5.21	8.06	6.39	2.08	4.47
2,3,3',4,4',5,5'-HpCB	189	1.0	33.9	15.3	34.2	10.2	13.6
CTEo			0.634	1.217	0.862	0.518	0.563
CTEd			0.634	1.218	0.862	0.519	0.564
% Lipids			0.46	0.93	0.52	0.25	0.34
Sample weight (g)			50.1	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PBV-WHS-C1	PBV-WHS-C2	PBO-EEL-C1	PBO-EEL-C2
3,3',4,4'-TCB	77	0.5	39.7	27.8	16.9	15.2
2',3,4,4',5-PeCB	123	0.5	45.8	38.9	55.2	39.5
2,3',4,4',5-PeCB	118	0.5	524	611	621	501
2,3,4,4',5-PeCB	114	0.5	2.23	<DL	5.24	2.24
2,3,3',4,4'-PeCB	105	0.5	31.5	29.4	33.4	21.6
3,3',4,4',5-PeCB	126	0.5	16.9	13.2	41.2	22.8
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	2.04	<DL
2,3,3',4,4',5-HxCB	156	1.0	315	498	323	297
2,3,3',4,4',5'-HxCB	157	1.0	3.05	<DL	2.58	<DL
3,3',4,4',5,5'-HxCB	169	1.0	32.9	26.8	41.8	25.4
2,3,3',4,4',5,5'-HpCB	189	1.0	41.5	31.0	62.5	28.9
CTEo			2.247	1.911	4.782	2.744
CTEd			2.247	1.912	4.782	2.745
% Lipids			7.19	6.52	13.56	11.82
Sample weight (g)			50.1	50.1	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PWD-SMB-1	PWD-SMB-2	PWD-SMB-3	PWD-SMB-4	PWD-SMB-5
3,3',4,4'-TCB	77	0.5	20.5	25.8	41.2	29.7	16.3
2',3,4,4',5-PeCB	123	0.5	66.1	88.2	95.2	75.6	48.2
2,3',4,4',5-PeCB	118	0.5	153	129	139	147	95.7
2,3,4,4',5-PeCB	114	0.5	2.01	<DL	4.66	1.55	<DL
2,3,3',4,4'-PeCB	105	0.5	34.1	51.9	65.8	55.7	21.4
3,3',4,4',5-PeCB	126	0.5	1.93	1.48	4.59	3.22	0.55
2,3',4,4',5,5'-HxCB	167	1.0	20.3	13.6	26.8	21.7	15.7
2,3,3',4,4',5-HxCB	156	1.0	37.8	48.8	78.5	61.5	22.6
2,3,3',4,4',5'-HxCB	157	1.0	1.55	3.09	4.25	2.51	<DL
3,3',4,4',5,5'-HxCB	169	1.0	2.33	0.87	1.89	1.09	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	10.8	13.1	18.6	16.2	7.75
Total TEQ (ND=0)			0.266	0.214	0.558	0.398	0.085
Total TEQ (ND=DL)			0.266	0.214	0.558	0.398	0.096
% Lipids			0.299	0.306	0.595	0.426	0.172
Sample weight (g, wet weight)			50.1	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PWD-WHS-C1	PWD-WHS-C2
3,3',4,4'-TCB	77	0.5	224	301
2',3,4,4',5-PeCB	123	0.5	267	229
2,3',4,4',5-PeCB	118	0.5	197	188
2,3,4,4',5-PeCB	114	0.5	16.7	17.9
2,3,3',4,4'-PeCB	105	0.5	231	255
3,3',4,4',5-PeCB	126	0.5	18.9	20.3
2,3',4,4',5,5'-HxCB	167	1.0	56.7	35.7
2,3,3',4,4',5-HxCB	156	1.0	177	199
2,3,3',4,4',5'-HxCB	157	1.0	3.69	6.2
3,3',4,4',5,5'-HxCB	169	1.0	66.8	51.7
2,3,3',4,4',5,5'-HpCB	189	1.0	157	166
Total TEQ (ND=0)			2.765	2.773
Total TEQ (ND=DL)			2.765	2.773
% Lipids			10.728	11.776
Sample weight (g, wet weight)			50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PWB-SMB-01	PWB-SMB-02	PWB-SMB-03	PWB-SMB-04	PWB-SMB-05
3,3',4,4'-TCB	77	0.5	8.48	11.3	18.4	5.29	20.8
2',3,4,4',5-PeCB	123	0.5	17.6	8.78	12.8	2.69	16.7
2,3',4,4',5-PeCB	118	0.5	209	168	264	102	301
2,3,4,4',5-PeCB	114	0.5	1.20	<DL	8.93	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	38.6	15.7	25.6	8.79	12.8
3,3',4,4',5-PeCB	126	0.5	10.3	5.28	13.2	4.97	3.99
2,3',4,4',5,5'-HxCB	167	1.0	<DL	<DL	3.02	<DL	1.48
2,3,3',4,4',5-HxCB	156	1.0	75.6	39.0	95.2	45.8	166
2,3,3',4,4',5'-HxCB	157	1.0	1.55	<DL	3.35	<DL	8.95
3,3',4,4',5,5'-HxCB	169	1.0	1.51	1.06	4.27	0.88	1.94
2,3,3',4,4',5,5'-HpCB	189	1.0	4.81	4.21	5.88	2.36	5.56
Total TEQ (ND=0)			1.112	0.579	1.449	0.541	0.542
Total TEQ (ND=DL)			1.112	0.580	1.449	0.542	0.542
% Lipids			0.403	0.255	0.510	0.093	0.644
Sample weight (g, wet weight)			50.0	50.1	50.0	50.0	50.1

DEP ID Congener	IUPAC #	DL ng/kg	PWB-WHS-C1	PWB-WHS-C2
3,3',4,4'-TCB	77	0.5	79.4	101
2',3,4,4',5-PeCB	123	0.5	82.5	88.2
2,3',4,4',5-PeCB	118	0.5	881	794
2,3,4,4',5-PeCB	114	0.5	48.6	38.9
2,3,3',4,4'-PeCB	105	0.5	212	101
3,3',4,4',5-PeCB	126	0.5	34.4	31.4
2,3',4,4',5,5'-HxCB	167	1.0	2.55	1.22
2,3,3',4,4',5-HxCB	156	1.0	357	161
2,3,3',4,4',5'-HxCB	157	1.0	26.3	2.65
3,3',4,4',5,5'-HxCB	169	1.0	21.8	17.3
2,3,3',4,4',5,5'-HpCB	189	1.0	62.9	34.8
Total TEQ (ND=0)			4.006	3.526
Total TEQ (ND=DL)			4.006	3.526
% Lipids			9.283	6.956
Sample weight (g, wet weight)			50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	SWP-SMB-01	SWP-SMB-02	SWP-SMB-03	SWP-SMB-04	SWP-SMB-05
3,3',4,4'-TCB	77	0.5	3.22	6.99	7.21	10.8	5.79
2',3,4,4',5-PeCB	123	0.5	6.97	8.41	10.2	19.9	15.3
2,3',4,4',5-PeCB	118	0.5	52.2	102	147	166	91.6
2,3,4,4',5-PeCB	114	0.5	<DL	4.87	3.09	9.02	1.55
2,3,3',4,4'-PeCB	105	0.5	2.05	9.75	13.8	27.5	11.2
3,3',4,4',5-PeCB	126	0.5	<DL	0.54	1.14	2.44	<DL
2,3',4,4',5,5'-HxCB	167	1.0	3.69	6.31	8.84	10.3	4.69
2,3,3',4,4',5-HxCB	156	1.0	12.7	21.8	33.6	40.2	15.7
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	0.85	1.25	<DL
3,3',4,4',5,5'-HxCB	169	1.0	0.99	5.51	8.71	12.5	2.66
2,3,3',4,4',5,5'-HpCB	189	1.0	11.4	10.6	17.3	21.5	5.29
Total TEQ (ND=0)			0.024	0.136	0.240	0.419	0.048
Total TEQ (ND=DL)			0.075	0.137	0.240	0.419	0.099
% Lipids			0.582	0.657	0.846	0.964	0.582
Sample weight (g, wet weight)			50.0	47.5	50.0	50.0	50.0

DEP ID Congener	IUPAC #	DL ng/kg	SFS-SMB-01	SFS-SMB-02	SFS-SMB-03	SFS-SMB-04
3,3',4,4'-TCB	77	0.5	12.7	7.75	10.2	5.26
2',3,4,4',5-PeCB	123	0.5	51.4	33.6	42.6	21.7
2,3',4,4',5-PeCB	118	0.5	49.7	34.9	37.1	28.9
2,3,4,4',5-PeCB	114	0.5	1.14	0.55	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	21.6	13.7	16.6	12.7
3,3',4,4',5-PeCB	126	0.5	12.4	6.29	8.84	7.26
2,3',4,4',5,5'-HxCB	167	1.0	16.7	8.87	11.2	5.29
2,3,3',4,4',5-HxCB	156	1.0	22.1	13.1	16.4	9.51
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	9.65	6.27	4.59	3.11
2,3,3',4,4',5,5'-HpCB	189	1.0	14.2	8.85	11.2	5.57
Total TEQ (ND=0)			1.363	0.708	0.950	0.769
Total TEQ (ND=DL)			1.364	0.709	0.951	0.770
% Lipids			0.683	0.358	0.426	0.275
Sample weight (g, wet weight)			50.0	50.0	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	SEN-SMB-01	SEN-SMB-02	SEN-SMB-03	SEN-SMB-04	SEN-SMB-05
3,3',4,4'-TCB	77	0.5	3.59	8.22	4.58	6.75	7.59
2',3,4,4',5-PeCB	123	0.5	77.8	69.7	49.7	66.3	84.2
2,3',4,4',5-PeCB	118	0.5	370	213	165	225	197
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	67.5	75.4	61.2	88.2	32.4
3,3',4,4',5-PeCB	126	0.5	7.40	9.68	5.21	8.34	12.6
2,3',4,4',5,5'-HxCB	167	1.0	6.61	18.4	12.0	16.5	21.6
2,3,3',4,4',5-HxCB	156	1.0	103	126	89.7	115	134
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	1.15
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	24.4	31.7	40.1	38.9	35.2
Total TEQ (ND=0)			0.846	1.071	0.598	0.934	1.363
Total TEQ (ND=DL)			0.857	1.082	0.609	0.945	1.374
% Lipids			0.340	0.775	0.613	0.754	1.030
Sample weight (g, wet weight)			50.0	50.0	50.1	50.1	50.1

DEP ID Congener	IUPAC #	DL ng/kg	SED-SMB-01	SED-SMB-02	SED-SMB-03	SED-SMB-04	SED-SMB-05
3,3',4,4'-TCB	77	0.5	15.9	6.14	7.55	18.3	14.2
2',3,4,4',5-PeCB	123	0.5	78.2	44.2	48.9	82.3	13.4
2,3',4,4',5-PeCB	118	0.5	124	65.3	71.2	147	107
2,3,4,4',5-PeCB	114	0.5	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4'-PeCB	105	0.5	24.6	13.7	15.9	30.1	21.1
3,3',4,4',5-PeCB	126	0.5	15.2	6.59	8.89	16.8	13.8
2,3',4,4',5,5'-HxCB	167	1.0	38.2	18.7	21.4	42.2	31.9
2,3,3',4,4',5-HxCB	156	1.0	161	99.5	106	147	121
2,3,3',4,4',5'-HxCB	157	1.0	<DL	<DL	<DL	<DL	<DL
3,3',4,4',5,5'-HxCB	169	1.0	<DL	<DL	<DL	<DL	<DL
2,3,3',4,4',5,5'-HpCB	189	1.0	41.8	24.5	28.7	48.7	30.8
Total TEQ (ND=0)			1.629	0.724	0.959	1.787	1.459
Total TEQ (ND=DL)			1.640	0.735	0.970	1.797	1.470
% Lipids			1.778	0.884	0.867	1.964	1.755
Sample weight (g, wet weight)			50.1	50.0	50.0	50.0	50.1

3.1.2

FISH CONSUMPTION ADVISORIES- SPECIFIC RIVERS

FISH CONSUMPTION ADVISORIES – SPECIFIC RIVERS

East Branch of the Sebasticook River

The goal of Maine's Dioxin Monitoring Program is "to determine the nature of dioxin contamination in the waters and fisheries of the State". Charged with administration of the program, the Department of Environmental Protection (DEP) is required to sample fish once a year below bleached pulp mills, municipal wastewater treatment plants, or other known or likely sources of dioxin. Costs of sample collection and analysis are assessed as a fee to the selected facilities.

Fish consumption advisories continue in the East Branch of the Sebasticook River in Newport likely due to past discharges of dioxins from the Eastland Woolen Mill, no longer in business and unable to fund necessary monitoring. In 2001 fish were collected from the County Road Bridge downstream from Corinna at the inlet to Sebasticook lake and downstream of the lake in Detroit for dioxin analysis.

Results may be seen in the 2001 Dioxin Monitoring Program report at
<http://www.state.me.us/dep/blwq/docmonitoring/swat/index.htm>

3.1.3

EFFECTS-BASED FISH STUDY

EFFECTS-BASED FISH STUDY

Introduction

To date, most SWAT studies of fish have focused on the effects of persistent, toxic, and bioaccumulative (PBT) contaminants on human consumers, with some consideration of impacts to wildlife consumers as well. Direct effects on fish populations have been measured or estimated by other DEP programs able to detect only relatively severe impacts on survival, growth, and reproduction. Recent studies (Adams et al, 1992; Kavlock et al, 1996; Munkittrick et al, 1998; Rolland et al, 1997) have measured other more subtle effects on development, reproduction, and immune system function not normally found by testing regimes historically used by DEP. These effects may be a result of long term exposure to relatively low levels of contaminants or cumulative effects of exposure to many low-level contaminants. These responses to pollutant challenge are often within the same order of magnitude as natural variation and therefore difficult to measure with the methods that are currently used. Many new techniques, such as cumulative effects-driven assessments of fish populations have been developed to measure some of these effects.

DEP has assisted Environment Canada (EC) with cumulative effects-driven assessments of fish populations on the St John River in 1999 and 2000 that have documented potential impacts to fish populations. In 2000 EC assisted DEP in similar studies of the North Branch of Presque Isle Stream and Prestile Stream, where high concentrations of DDT, a known endocrine disruptor, have been previously found. Lack of suitable reference streams made interpretation of the results difficult. Nevertheless, it appears that there were adverse impacts on reproduction of brook trout, but they may be mitigated by high productivity of the streams.

A 1994 partial cumulative effects-driven assessment of a fish population from the Androscoggin River downstream of 3 bleached kraft pulp and paper mills with secondary treatment, documented some of the effects found in studies elsewhere (McMaster et al, 1996). Female white suckers showed increased mixed function oxidase (MFO) enzymes in the liver, reduced levels of circulating estradiol (E2), reduced gonad size (GSI), and increased levels of circulating testosterone (T) when compared to a putative reference population in Androscoggin Lake. In-vitro steroid production by ovarian follicles showed no differences in basal and human chorionic gonadotropin (hCG) stimulated E2 between experimental and reference stations, but in-vitro basal levels of T were reduced in the exposed fish in contrast to circulating levels. No other lesions in the pathway were measured unlike previous studies elsewhere. Exposed brown bullhead showed induction of MFO for both sexes. There were no other differences in any measure in females between the populations. Condition factor (K) was lower in exposed males than in unexposed males. There were decreased circulating levels of T and 11 ketotestosterone (11-KT) in exposed males but in vitro levels of both were similar at both sites.

Since 1994, the 3 bleached kraft mills on the Androscoggin River have made significant modifications to their process, primarily to decrease their discharge of dioxin. Modifications include changes in brownstock washing, reduced use of precursors, and

increased recovery of chemicals. Most important of all is a switch to elemental chlorine free (ECF) bleaching, using oxygen and chlorine dioxide (CLO₂) instead of elemental chlorine, by the end of 1999. These changes have improved the overall quality of the effluent.

The primary objective of this study was to determine if ECF and other changes in effluent quality since 1994 have eliminated impacts on reproductive performance of fish from the Androscoggin River. A second objective was to determine, if impacts have not been eliminated, whether or not impacts could be measured at a population level. The conceptual model is that endocrine disrupting substances in the discharges from the bleached kraft pulp and paper mills and/or municipal treatment plants result in differences in circulating levels of E2, 11-KT, and T between experimental and reference stations, which lead to adverse effects on populations as indicated by GSIs, population estimates and other population characteristics. Another objective was to determine if other biomarkers, such as plasma cortisol (F) levels, liver somatic index (LSI) and MFO activity, are correlated with circulating levels of sex steroids and linked to population level effects.

Materials and Methods

In 2001 we repeated studies originally conducted in 1994 on white suckers from the Androscoggin River and Androscoggin Lake. In addition, in 2001 we expanded the study to sample fish from impoundments above and below each bleached kraft pulp and paper mill and major municipal sewage discharge on the river. Stations were 1) Umbagog Lake (AUL), above Fraser Paper Company's pulp and paper mills and municipal wastewater treatment plants in Berlin/Gorham New Hampshire, 2) Rumford Point (ARP), below Berlin and above Mead Paper and the Rumford-Mexico wastewater treatment plant in Rumford and Mexico, 3) Riley (ARY), below Rumford and above International Paper in Jay, 4) Livermore Falls (ALV) below Jay, 5) Gulf Island Pond (AGI), a deep impoundment below the Livermore Falls wastewater treatment plant, and 6) Androscoggin Lake (ALW) (**MAP???**). We measured biomarkers of fish performance, (E2, 11-KT, T, LSI, and MFO) as well as population characteristics (GSI, mean age and age structure, growth rate and condition factor, fecundity and egg size, gonadal development and/or presence of heterosex). In related studies during the spring, we are trapping, marking, and recapturing suckers on the spring spawning run and in the fall to develop population estimates for Gulf Island Pond and a reference station, Pocasset Lake, to determine any impact on fish populations in the river.

In the field, live white suckers were collected from each site by trapnets or gillnets during fall recrudescence as in 1994. At least 20 males and 20 females were measured for length and weight. Blood samples were collected from live fish from the heart and/or caudal artery or vein via 21 ga syringes into heparinized Vacutainers and placed on ice for transport to the lab the same day. The fish were then killed with a blow to the head. Livers were dissected out, weighed and frozen in liquid nitrogen. Gonads were dissected out, weighed, and a small sample ~1 cm square taken and placed in 10% buffered

formalin for storage. The operculum and pectoral fins were taken for aging and stored at -20C until analyzed. Gonad samples remained in formalin for further analyses.

Later the same day in the lab samples were placed in proper storage to await analyses. Plasma was collected from the blood samples after centrifugation in the lab and then frozen at -20C for radioimmunoassay (RIA) analysis for T, 11-KT, E2, following the method of McMaster et al (1992). Liver samples were stored at -80 C for MFO analysis as outlined by Munkittrick et al (1992). Cortisol was not measured in 2001 samples, but will be measured in 2002 samples.

Gonad samples sent to Environment Canada have not yet been analyzed, so no discussion of egg size, gonadal development and presence of heterosex is included in this report. Eggs size will be measured in a subsample of at least 100 eggs per ovary. Histological samples of gonads will be prepared and examined for the presence of testis-ova as outlined in Gray and Metcalf (1997) or analysis of gonadal staging (McMaster, 2001).

Statistical differences between the means of the samples for pairs of stations above and below the major point sources were determined for each variable using the Students t-test if the variances were equal, data were normally distributed, and the p-value was lower than that obtained with the non-parametric Mann-Whitney U test. Otherwise, the Mann-Whitney test was used.

Results and Discussion

There were no stations where all the measurements clearly indicated either an impact or no impact (Table 3.1.3.1). Distinction between significant differences, either positive (+) or negative (-), and no significant difference (0), among stations can be small (i.e. p-value of 0.04 vs. 0.06) however. In addition, previous studies have shown considerable variation in responses from one year to the next (Munkittrick et al, 2000). These differences among stations and years can be influenced by a number of factors including violation of the assumption of equal error of measurement between stations, streamflow, nutrient supply and food abundance, pollutant discharge rates, and weather conditions, any of which may exacerbate or mitigate marginal impacts. Therefore, final conclusions cannot be made on the basis of a single year's data. The study will be repeated in 2002 and additional measurements of these potentially confounding variables will be made.

Nevertheless, a preliminary discussion of the data from each station may elucidate potential impacts. Of all the measurements of biomarkers and population characteristics, there were several significant differences above and below major discharges. There were also differences in responses between males and females at the same stations, but these differences were not the same for all stations.

The most upstream station, AUL, Lake Umbagog, is a National Wildlife Refuge and where the Androscoggin River begins named as the the Androscoggin River. There are no known point source discharges into it or its headwaters. It therefore serves as a reference station for the discharges from the (now) Nefco -Fraser bleached kraft pulp

and paper mills and municipal treatment plants about 30 miles downstream in Berlin and Gorham, New Hampshire and smaller municipal treatment plant in Bethel, Maine.

Although the station ARP, at Rumford Point, is a considerable distance (approximately 50 miles) downstream of the mills and municipal treatment plants in New Hampshire, it serves to document any lingering effects that could confound any of those measured resulting from the discharge from Mead Paper Company's bleached kraft pulp and paper mill and the Rumford-Mexico municipal treatment plant immediately below in Rumford and Mexico respectively. Mean age and mean length of both male and female suckers were no different than at AUL (Figures 3.1.3.1 – 3.1.3.4), but condition factors of both were significantly greater than at AUL(Figures 3.1.3.5 – 3.1.3.6), showing that the fish here were heavier for their length than at Umbagog. These results may indicate increased productivity from the added nutrients from the mills and municipal treatment plants. Curiously, MFOs, an indicator of exposure to pulp and paper mill discharges, were significantly less here than at AUL for females but similar to those at AUL for males (Figures 3.1.3.7 – 3.1.3.8). LSI's, however, were in fact significantly higher than at AUL for both sexes (Figures 3.1.3.9 – 3.1.3.10), as has often been measured downstream of pulp and paper mill discharges (Munkittrick et al, 2000). There were no significant

Table 3.1.3.1 Significant changes in biomarkers and population characteristics compared to station above

station	sex	AGE p	LENGTH p	K p	MFO p	LSI p	11-KT p	T p	E2 p	GSI p
AUL	F									
ARP	F	0	0	+	-	+	0	0	0	+
ARY	F	0	+	+	0	0	0	0	+	0
ALV	F	-	-	0	0	0	0	0	-	+
ALW	F	+	0	-	0	-	0	0	0	0
AGI	F	-	-	0	0	0	0	0	0	0
AGI v ALV	F	0	-	-	0	0	+	+	+	-
AUL	M									
ARP	M	0	0	+	0	+	0	0	0	+
ARY	M	0	0	+	+	+	+	0	0	0
ALV	M	-	0	0	0	0	-	0	0	+
ALW	M	+	-	-	0	-	+	0	0	-
AGI	M	-	-	-	0	0	+	+	+	+
AGI v ALV	M	0	-	-	0	-	+	+	+	-

differences in circulating levels of sex steroids between this station and AUL Figures 3.1.3.11 –3.1.3.14). GSI's, a measure of fecundity, however, were significantly greater here for both males and females than at AUL (Figures 3.1.3.15 – 3.1.3.16), perhaps reflecting increased productivity. Since gonad samples remain to be analyzed, it is not yet known if increase GSI is due to increased egg size or number of eggs.

The station ARY is approximately 20 miles below Mead Paper Company's bleached kraft pulp and paper mill in Rumford and the Rumford-Mexico municipal treatment plant in Mexico. Here age of both males and females and length of males were no different than those at ARP, upstream of Rumford, but length of females was significantly greater than at ARP (Figures 3.1.3.1- 3.1.3.4). Condition factor was significantly greater for both sexes (Figures 3.1.3.5 –3.1.3.6) perhaps again due to increased nutrients and productivity from the industrial and municipal discharges in Rumford. MFOs were similar to those at ARP for females but significantly elevated in males, which were the highest of those from all stations (Figures 3.1.3.7 – 3.1.3.8). LSI's followed MFOs perhaps showing the response to exposure of conditions that induce MFOs (Figures 3.1.3.9 – 3.1.3.10). Among the sex steroids, 11-KT and E2 were significantly higher here than at ARP (Figures 3.1.3.12, 3.1.3.14), but curiously GSIs of males and females was not different than at ARP (Figures 3.1.3.15 – 3.1.3.16).

At ALV, immediately downstream of the International Paper Company's bleached kraft pulp and paper mill in Jay, age of both males and females and length of females were significantly lower than at ARY about 1 mile upstream of the mill (Figures 3.1.3.1 – 3.1.3.4), but condition factors were not different than at ARY (Figures 3.1.3.5 – 3.1.3.6)

despite increased nutrient supply from the mill. Neither MFOs (Figures 3.1.3.7 – 3.1.3.8) nor LSIs (Figures 3.1.3.9 – 3.1.3.10) were significantly different than at ARY either. Circulating levels of 11-KT and E2 were significantly lower than those at ARY (Figures 3.1.3.12, 3.1.3.14). However that was due to the high levels at ARY and those here were not significantly different than those at other upstream stations. GSIs were significantly higher here than at ARY, which is incongruent with the steroid data.

Androscoggin Lake, ALW, is a unique lake in Maine, in that it has a reverse delta from centuries of flooding from the Androscoggin River during spring flows and other high water events. Consequently it has received some pollutants from the river, although they have been highly diluted. Nevertheless, mass loading of some pollutants may be significant. In the 1994 study, this station was thought to be unimpacted by point sources and was used as a reference for Gulf Island Pond. In 1996, concentrations of dioxins exceeding any found in fish from any other lake or river station without point sources were measured in fish from Androscoggin Lake, documenting significant exposure to pulp and paper mill discharges to the river. Although since then concentrations of dioxin in fish have declined, questions regarding adverse impacts to fish populations in this lake remain. In 2001 mean ages of both male and female suckers was significantly greater than those of fish from ALV, the nearest upstream station (Figure 3.1.3.1 – 3.1.3.2), and in fact were the highest of all the stations. Mean length of females was similar to that at ALV, but mean length of males was significantly lower than at ALV (Figures 3.1.3.3 – 3.1.3.4). Condition factor was significantly lower than at ALV for both sexes (Figures 3.1.3.5 – 3.1.3.6), perhaps reflecting lower productivity. MFOs were no different than at ALV for either sex (Figures 3.1.3.7 – 3.1.3.8), but LSIs were significantly lower for both sexes than at ALV (Figures 3.1.3.9 – 3.1.3.10), perhaps again because of lower productivity. Concentrations of 11-KT were elevated in males (Figure 3.1.3.11), but curiously GSIs were significantly lower compared to ALV (Figure 3.1.3.16).

Gulf Island Pond, AGI, a large (15 miles long) deep (~80 feet) impoundment approximately 15 miles downstream of ALV, was the experimental station of the 1994 study. There is a small municipal treatment plant, which contributes some nutrients, between these two stations,. Unlike other stations, AGI is a net sink for sediments and associated contaminants. In 2001, mean ages were significantly lower for both sexes than those at ALW, which were highest of all stations, but similar to those at ALV (Figures 3.1.3.1 – 3.1.3.2). Mean lengths were significantly lower than at ALW or ALV for both males and females (Figures 3.1.3.3 – 3.1.3.4). Condition factor was significantly different (lower) than that at ALW for males only, but lower than those at ALV for both sexes (Figures 3.1.3.5 – 3.1.3.6). Unlike the 1994 study, MFOs were no different than those at ALW or in fact ALV either (Figures 3.1.3.7 – 3.1.3.8), indicating no difference in exposure to point sources. Like the 1994 study LSIs were no different than those at ALW, but they were significantly lower than those at ALV (Figures 3.1.3.9 – 3.1.3.10). As in 1994, circulating levels of T in males were significantly higher than at ALW, but unlike 1994, levels of 11-KT were also significantly higher and levels of E2 in females were no different than those at ALW (Figures 3.1.3.11 – 3.1.3.14). Levels of all sex steroids were significantly higher at AGI than at ALV, but GSIs were significantly lower for both sexes (Figures 3.1.3.15 – 3.1.3.16). Lower GSIs for females are similar to the results of the 1994 study.

These preliminary results document that some, but not all, of the impacts seen in the 1994 study remain. Lower GSIs in Gulf Island Pond indicate a population level effect. Responses at all stations are not entirely congruent with the conceptual model of effects of the discharges on reproduction mediated via endocrine disruption. The study will be repeated in 2002 to further elucidate any impacts of the discharges.

Figure 3.1.3.1 Mean age of female white suckers sampled from the Androscoggin River 2001

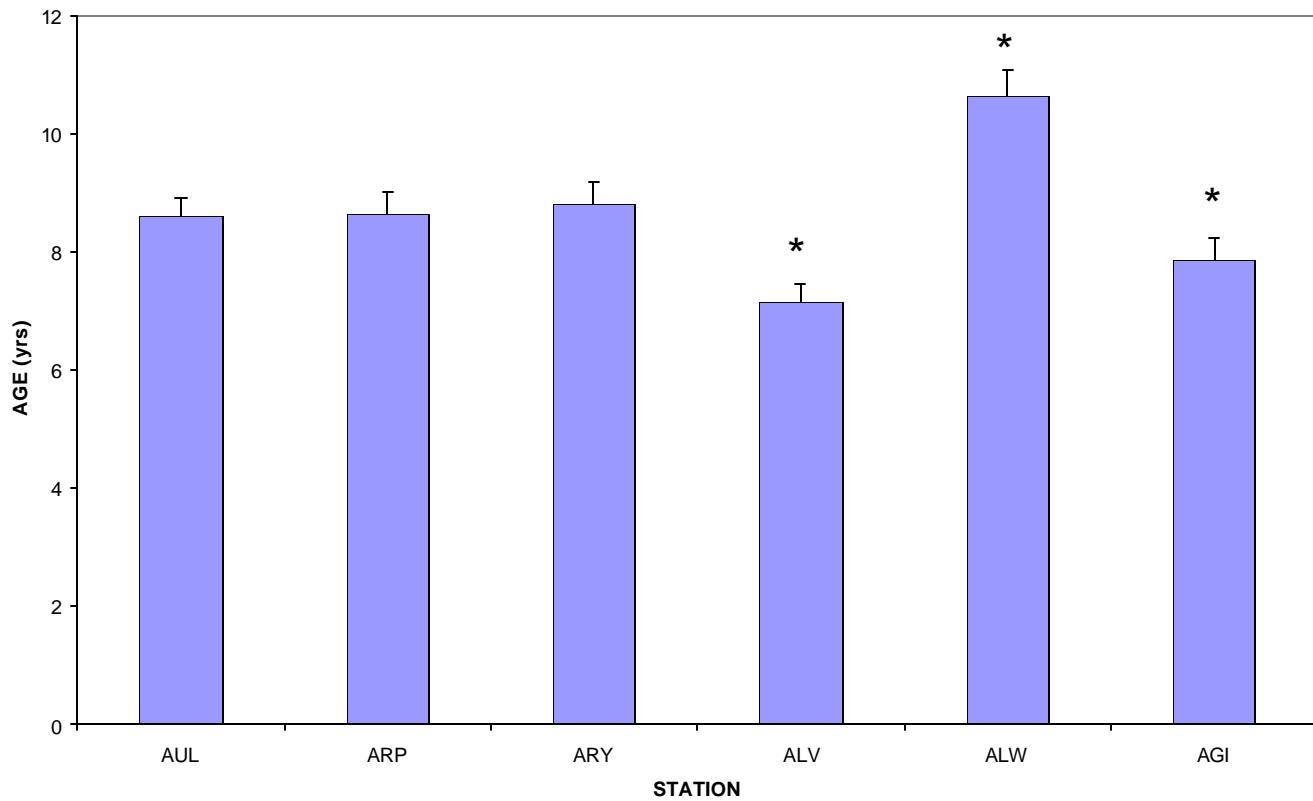


Figure 3.1.3.2 Mean age of male white suckers sampled from the Androscoggin River 2001

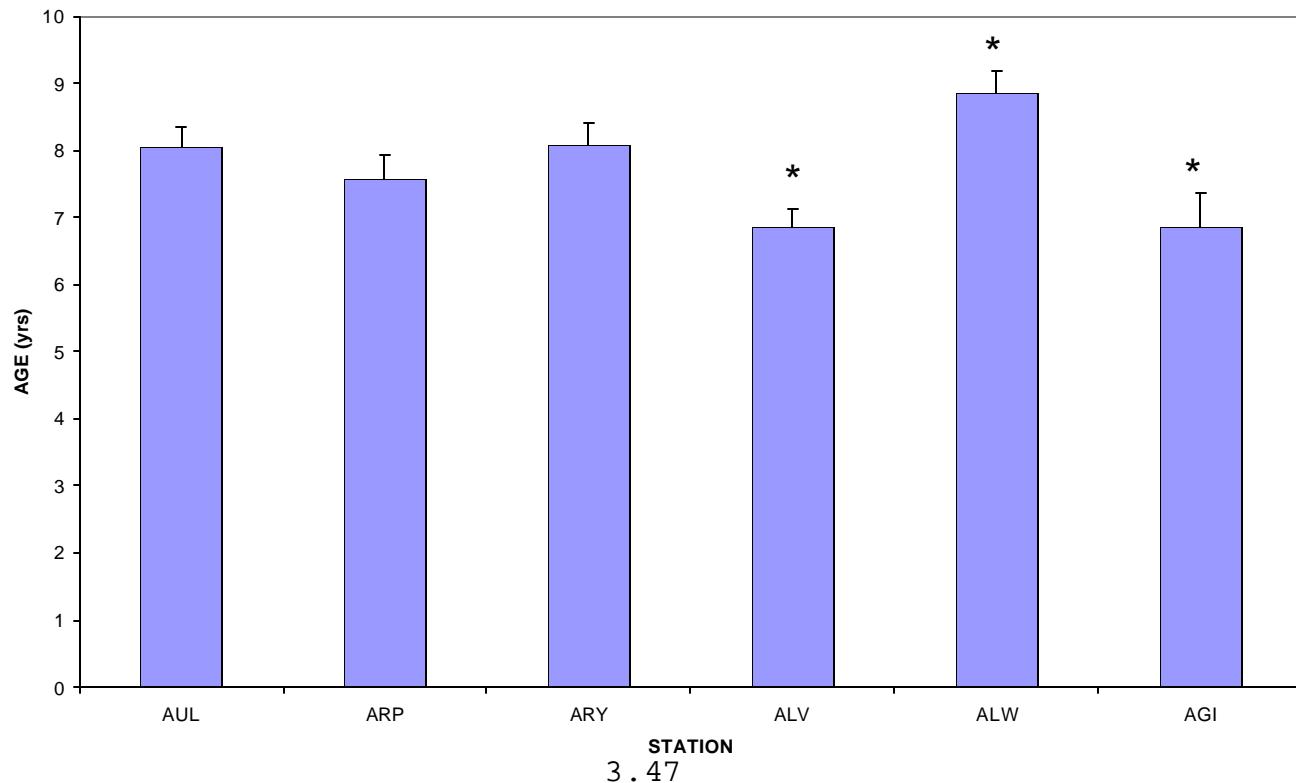


Figure 3.1.3.3 Mean length of female white suckers sampled from the Androscoggin River 2001

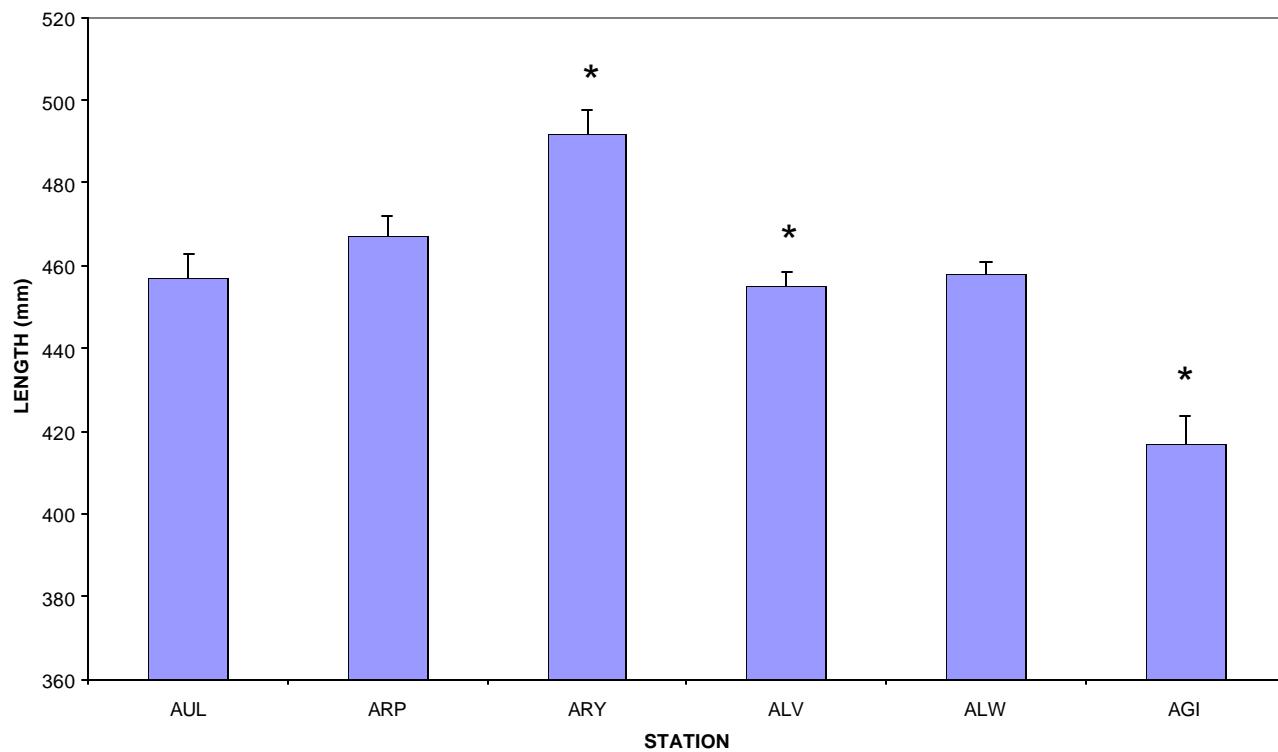


Figure 3.1.3.4 Mean length of male white suckers sampled from the Androscoggin River 2001

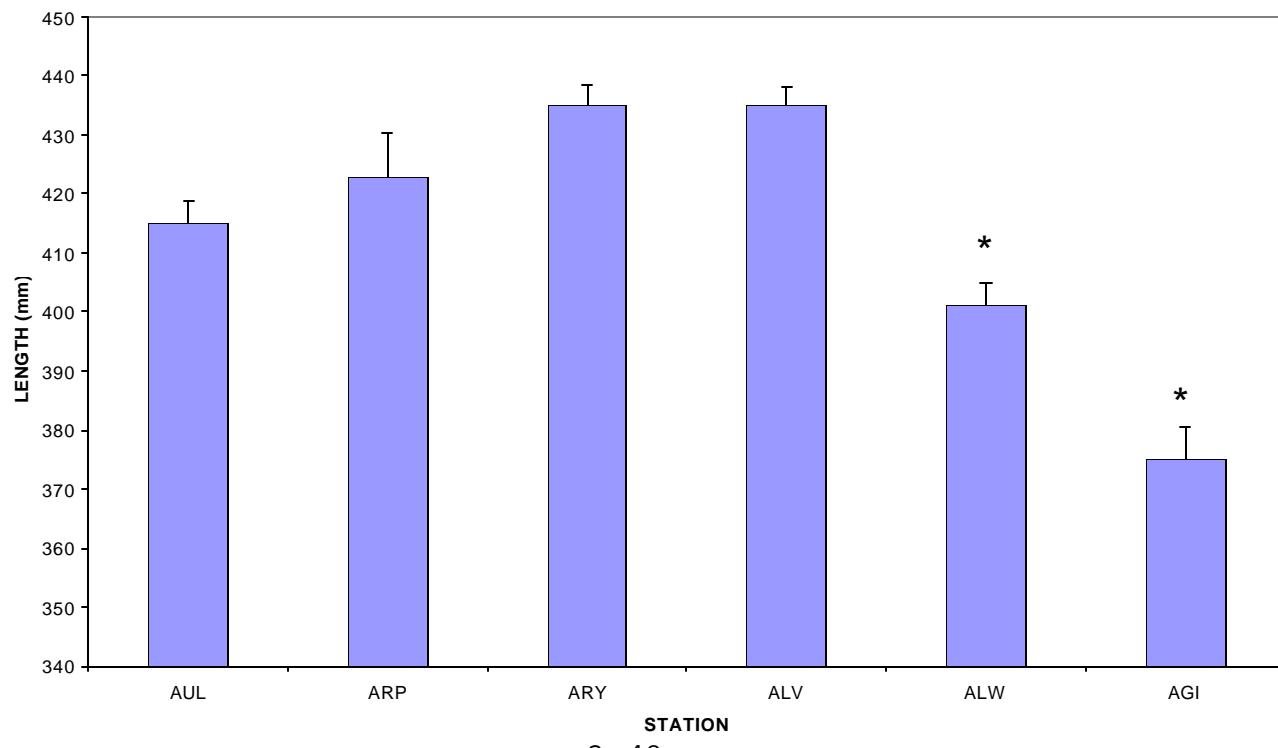


Figure 3.1.3.5 Mean condition factor (K) of female white suckers sampled from the Androscoggin River 2001

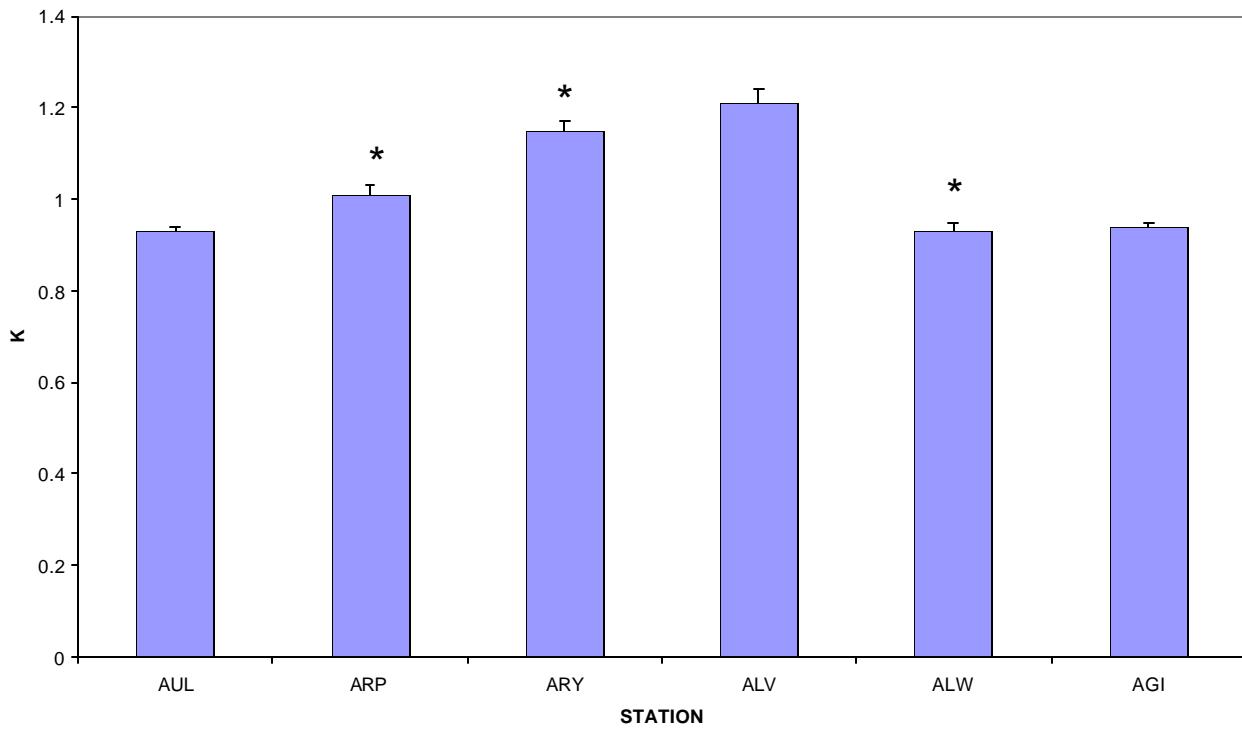


Figure 3.1.3.6 Mean condition factor (K) in male white suckers sampled from the Androscoggin River 2001

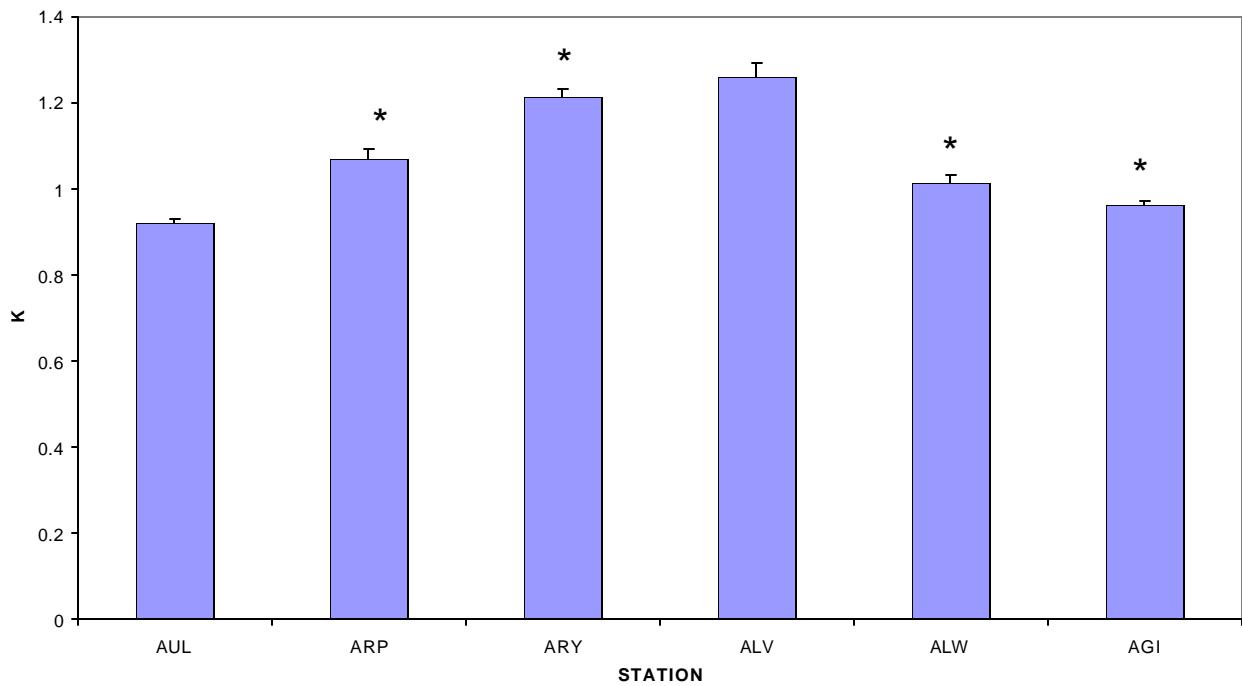


FIGURE 3.1.3.7 Mean MFO in female white suckers sampled from the Androscoggin River 2001

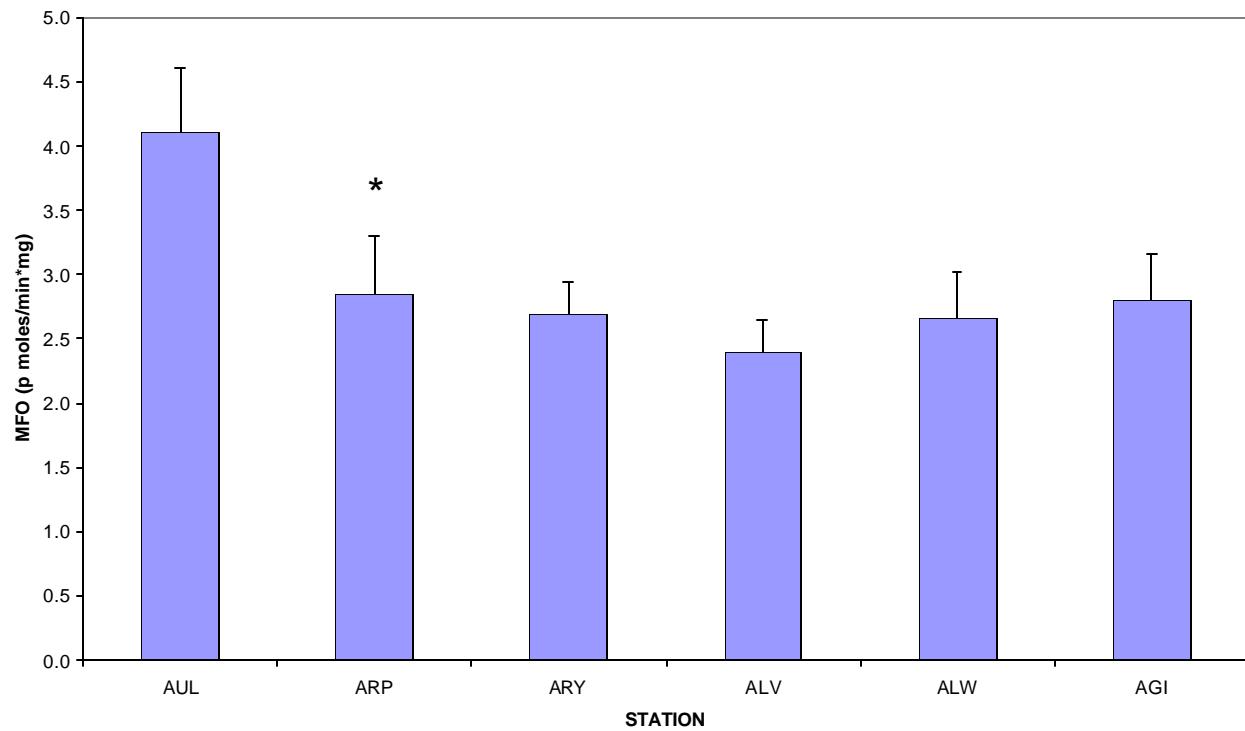


FIGURE 3.1.3.8 Mean MFO in male white suckers sampled from the Androscoggin River 2001

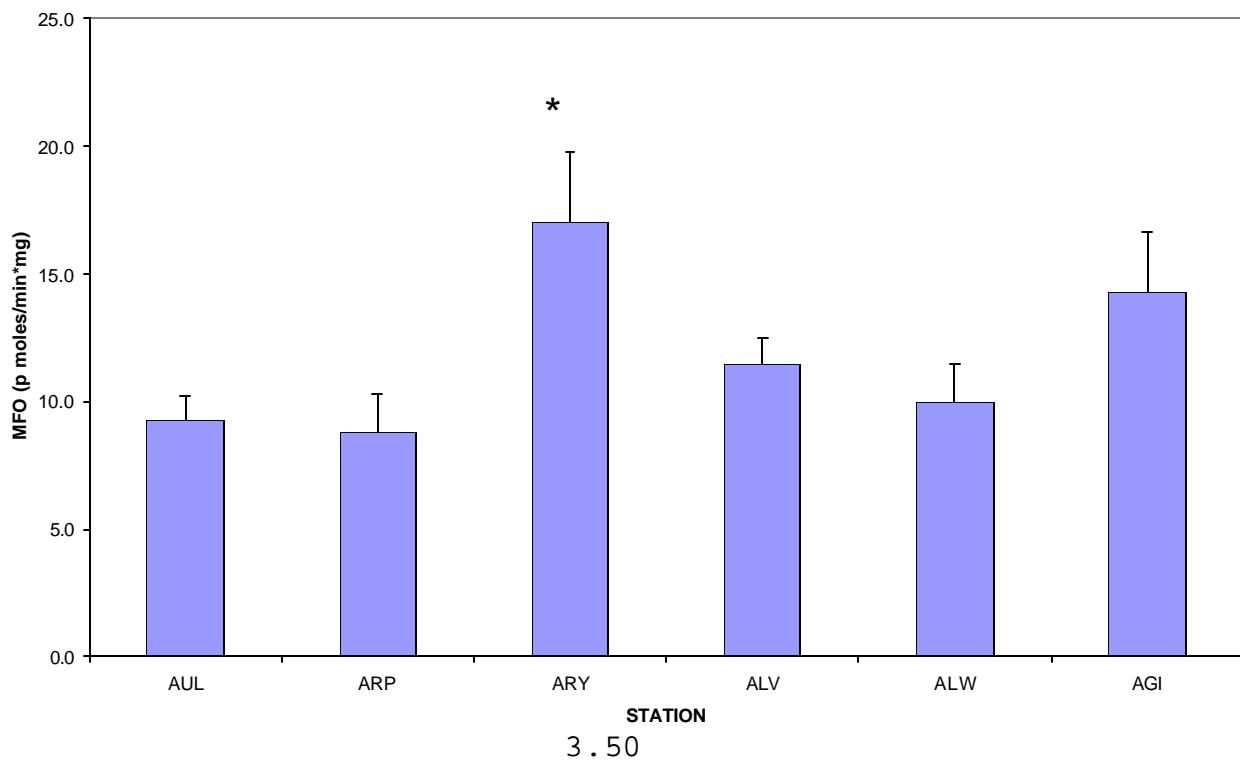


Figure 3.1.3.9 Mean LSI of female white suckers sampled from the Androscoggin River 2001

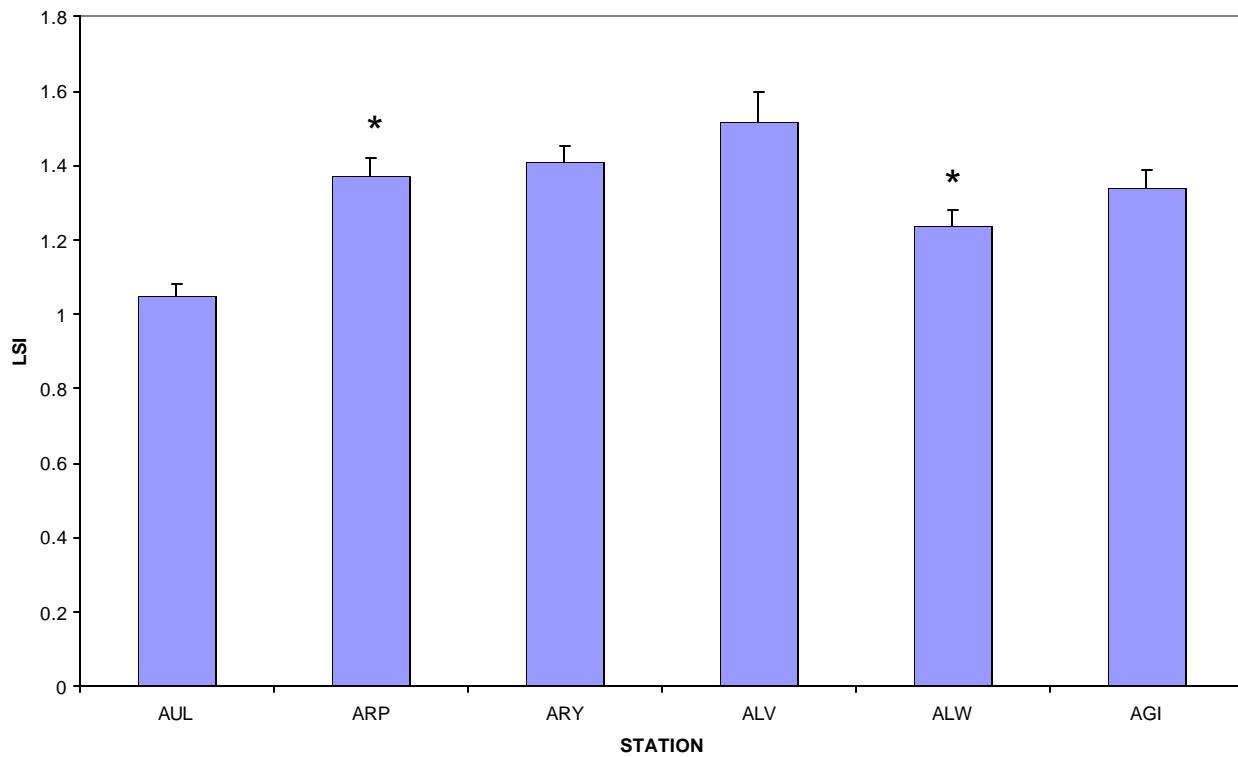


Figure 3.1.3.10 Mean LSI of male white suckers sampled from the Androscoggin River 2001

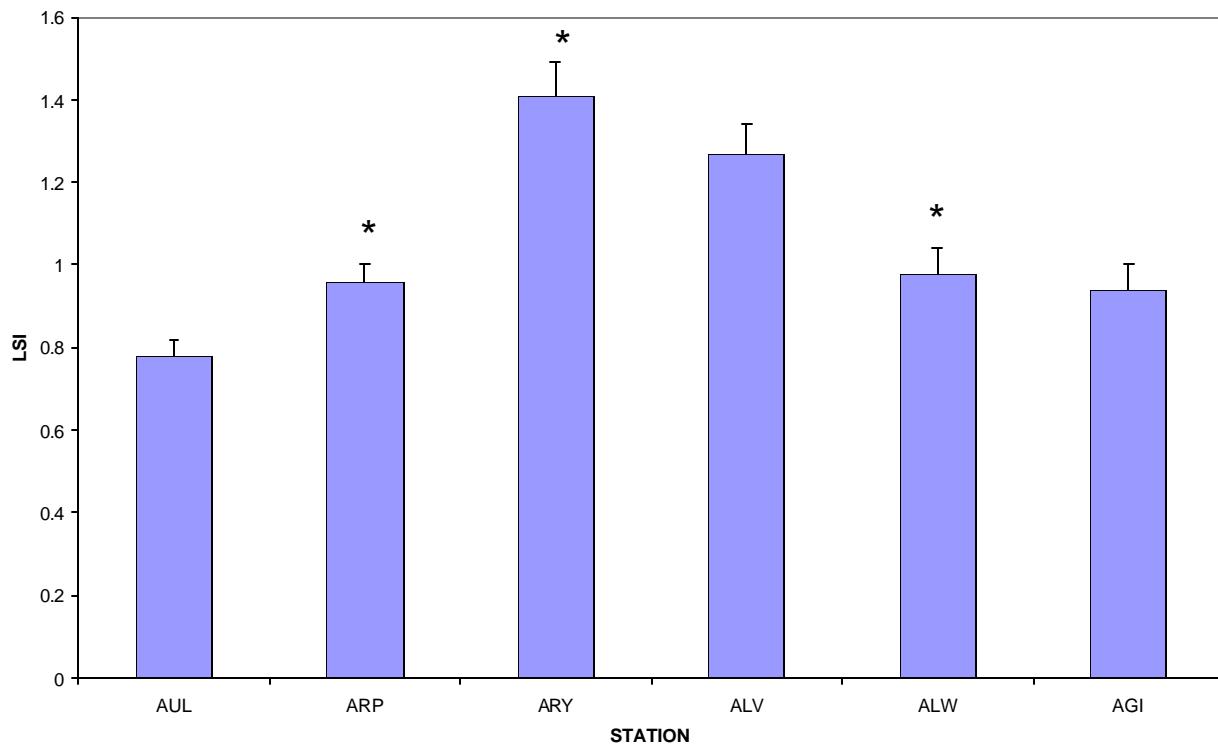


figure 3.1.3.11 Mean testosterone (T) concentrations in male white suckers from the Androscoggin River 2001

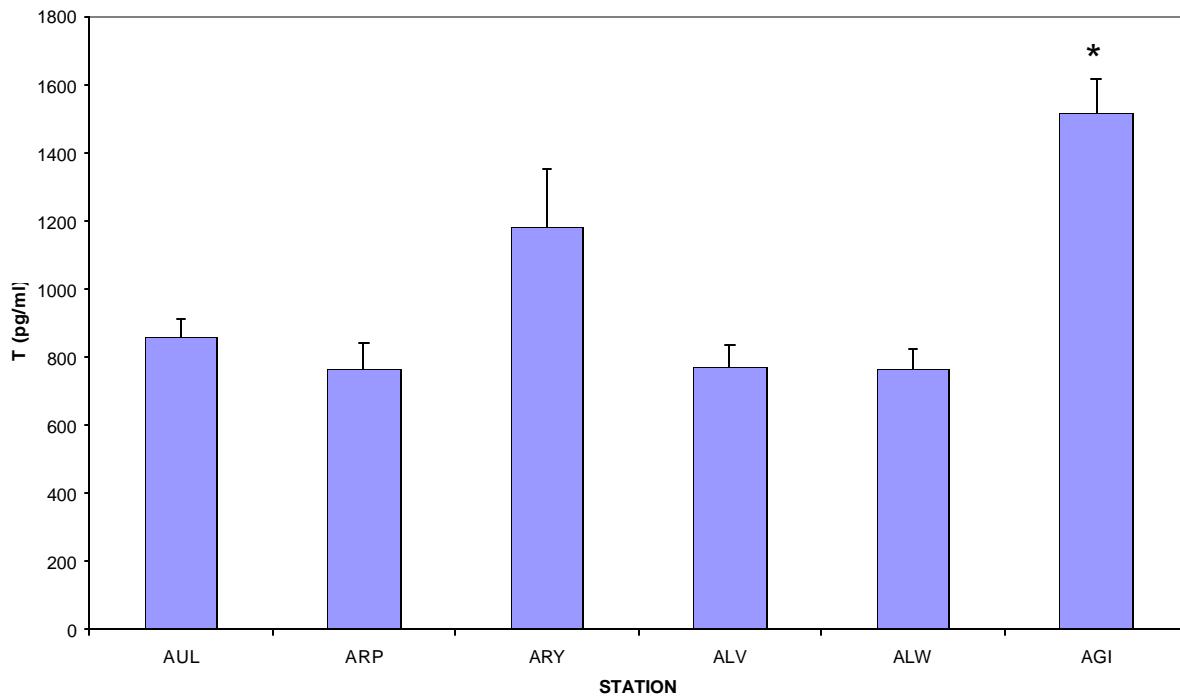


Figure 3.1.3.12 Mean 11-ketotestosterone (11-KT) concentrations in male white suckers from the Androscoggin River 2001

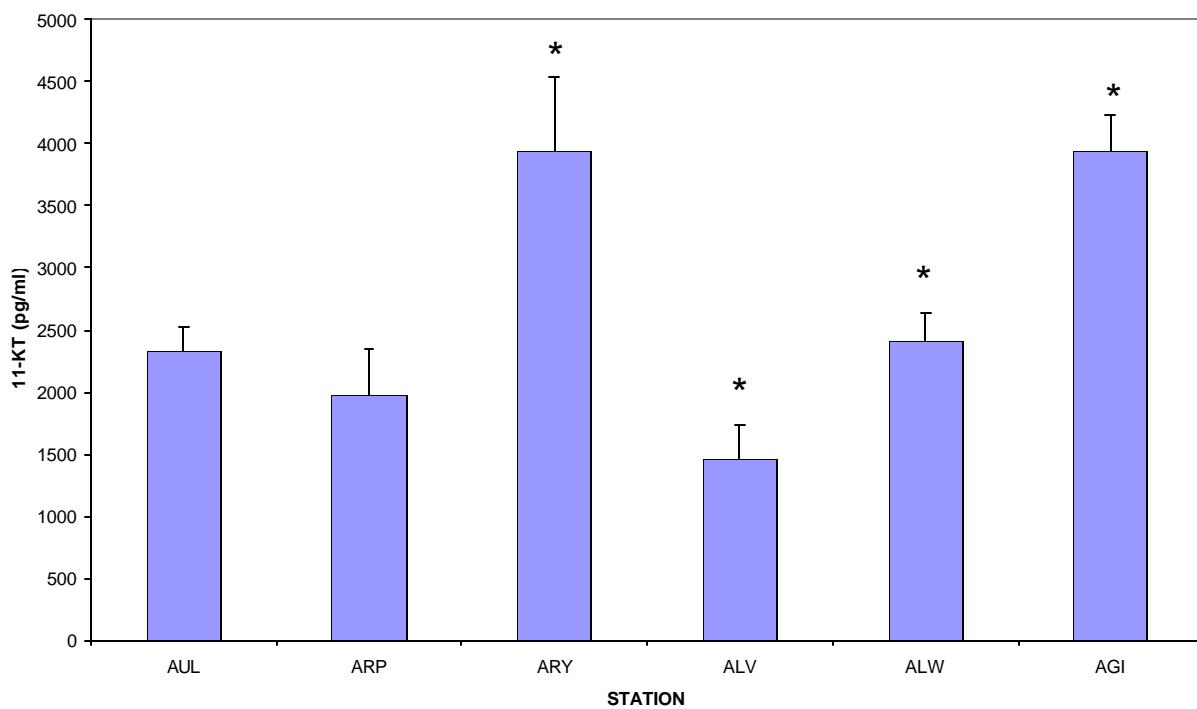


Figure 3.1.3.13 Mean testosterone (T) concentrations in female white suckers from the Androscoggin River 2001

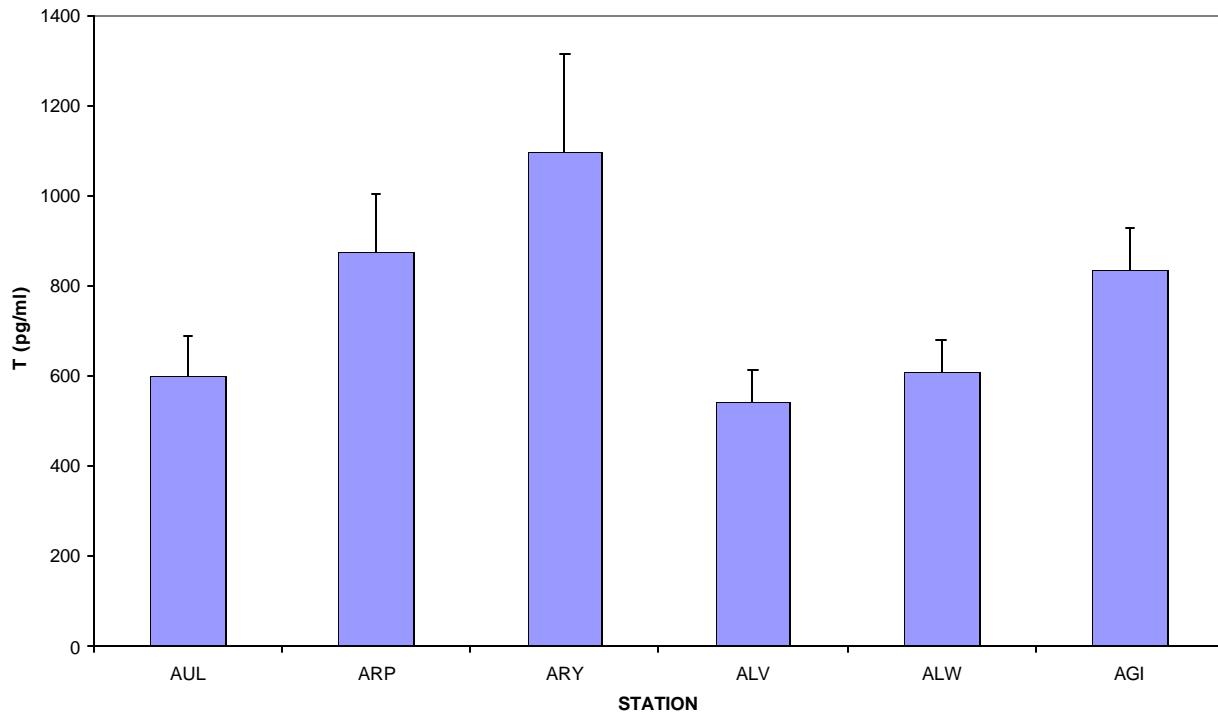


Figure 3.1.3.14 Mean estradiol (E2) concentrations in female white suckers from the Androscoggin River 2001

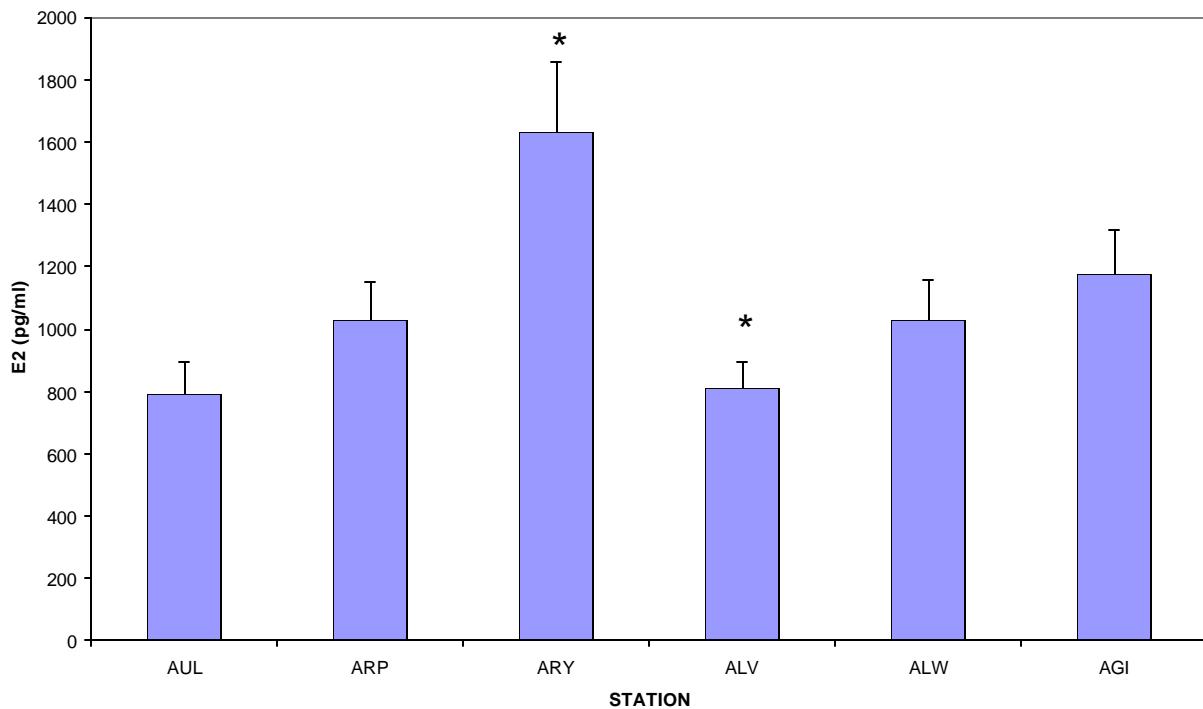


Figure 3.1.3.15 Mean GSI of female white suckers sampled from the Androscoggin River 2001

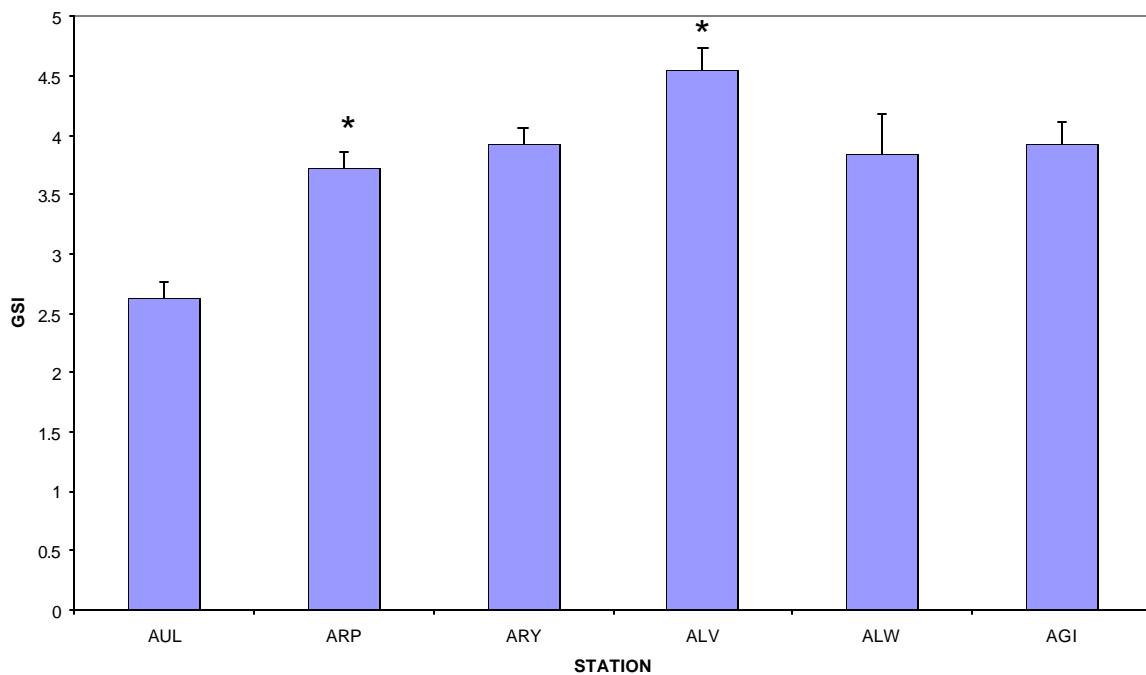
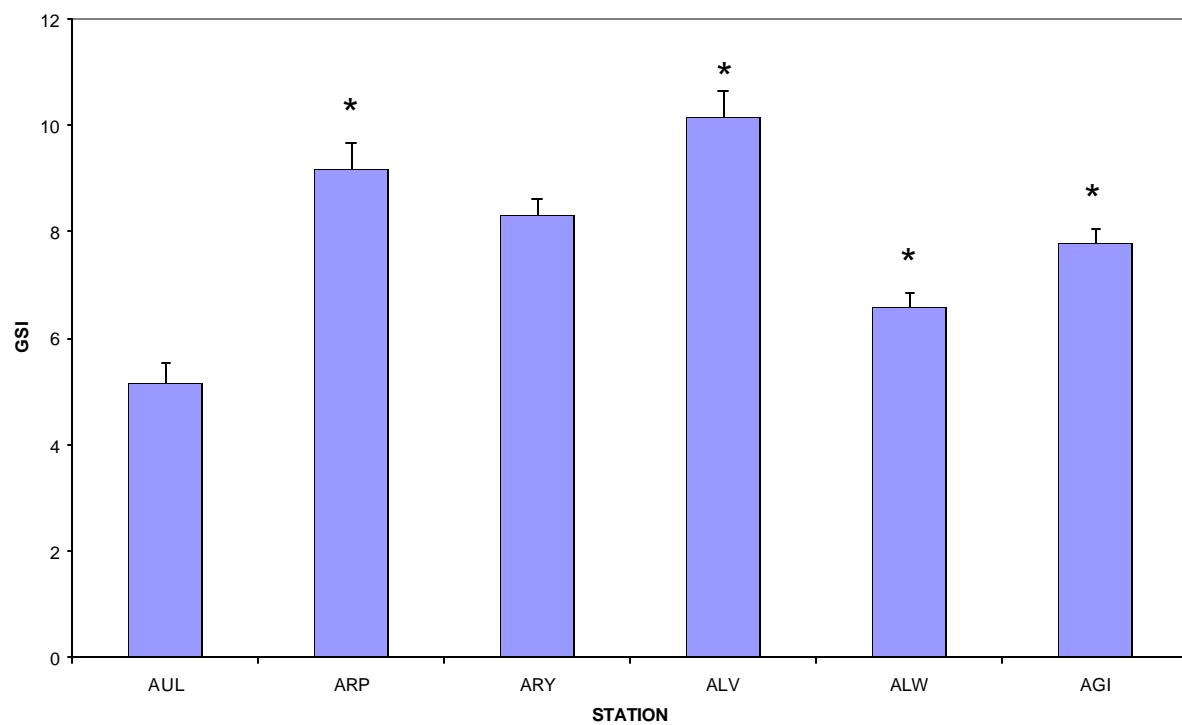


Figure 3.1.3.16 Mean GSI in male white suckers sampled from the Androscoggin River 2001



Raw field data

LOC.	SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT g	LIVER WT g	AGE yrs
AUL-WHS		2	9/4/01	F	422	786	21.09	7.46	7
AUL-WHS		3	9/4/01	F	479	1002	25.81	10.37	10
AUL-WHS		6	9/4/01	F	469	919	18.17	9.57	9
AUL-WHS		7	9/4/01	F	475	995	25.49	9.29	12
AUL-WHS		8	9/4/01	F	441	855	24.58	7.63	8
AUL-WHS		9	9/4/01	F	430	825	24.4	8.42	9
AUL-WHS		10	9/4/01	F	473	932	16.79	10.18	9
AUL-WHS		13	9/4/01	F	425	770	20.13	7.29	7
AUL-WHS		14	9/4/01	F	451	811	18.06	9.79	7
AUL-WHS		15	9/4/01	F	419	747	25.38	5.88	7
AUL-WHS		16	9/4/01	F	455	842	18.95	9.78	9
AUL-WHS		18	9/4/01	F	436	786	24.88	8.38	8
AUL-WHS		21	9/4/01	F	515	1245	33.46	12.39	7
AUL-WHS		22	9/4/01	F	380	539	13.08	4.85	6
AUL-WHS		23	9/4/01	F	465	866	18.38	8.15	10
AUL-WHS		24	9/4/01	F	460	1016	25.89	12.86	9
AUL-WHS		25	9/4/01	F	460	921	25.26	7.88	8
AUL-WHS		26	9/4/01	F	470	981	23.37	12.84	9
AUL-WHS		28	9/4/01	F	460	783	7.15	7.96	11
AUL-WHS		30	9/4/01	F	450	907	32.7	13.18	7
AUL-WHS		31	9/4/01	F	455	823		9.27	8
AUL-WHS		39	9/6/01	F	488	1016	21.54	9.2	10
AUL-WHS		40	9/6/01	F	460	895	25.28	8.55	9
AUL-WHS		41	9/6/01	F	442	863	37.09	9.35	7
AUL-WHS		46	9/6/01	F	485	999	16.24	11.13	8
	mean				455	881.3	22.63	9.27	8.44
	sd				27.2	131.7	6.52	2.09	1.45
	se				5.45	26.34	1.30	0.42	0.29
AUL-WHS		12	9/4/01	F?	522	1074	8.83	14.34	
AUL-WHS		5	9/4/01	I	395	667		3.89	5
AUL-WHS		1	9/4/01	IF	464	876	6.76	9.61	9
AUL-WHS		11	9/4/01	IM	401	658		4.43	6

LOC.	SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT g	LIVER WT g	AGE yrs
AUL-WHS	4	9/4/01	M	424	713	1.66	5.8	8	
AUL-WHS	17	9/4/01	M	361	513	25.7	5.03	5	
AUL-WHS	19	9/4/01	M	430	791	37.32	5.91	8	
AUL-WHS	20	9/4/01	M	430	737	43.71	5.46	9	
AUL-WHS	27	9/4/01	M	438	711	17.79	4.94	8	
AUL-WHS	29	9/4/01	M	417	732	41.06	5.29	7	
AUL-WHS	32	9/4/01	M	395	543	21.62	3.44	9	
AUL-WHS	33	9/4/01	M	440	761	34.35	8.74	9	
AUL-WHS	34	9/4/01	M	421	687	35.15	4.56	NS	
AUL-WHS	35	9/4/01	M	385	554	39.21	4.45	7	
AUL-WHS	36	9/4/01	M	374	483	12.42		6	
AUL-WHS	37	9/4/01	M	418	677	40.09	3.37	9	
AUL-WHS	38	9/6/01	M	435	699	16.33	6.42	9	
AUL-WHS	42	9/6/01	M	410	669	38.84	5.52	7	
AUL-WHS	43	9/6/01	M	427	699	43.93	4.9	9	
AUL-WHS	44	9/6/01	M	424	691	31.16	4.13	9	
AUL-WHS	45	9/6/01	M	435	785	32.35	6.06	10	
AUL-WHS	47	9/6/01	M	423	675	37.61	4.77	9	
AUL-WHS	48	9/6/01	M	364	476	32.68	3.9	5	
AUL-WHS	49	9/6/01	M	447	704	14.61	6.46	12	
AUL-WHS	50	9/6/01	M	440	735	33.89	5.72	9	
AUL-WHS	51	9/6/01	M	395	469	20.28	6.96	9	
AUL-WHS	52	9/6/01	M	441	776	28.85	5.06	9	
AUL-WHS	53	9/6/01	M	403	592	30.12	3.84	8	
AUL-WHS	54	9/6/01	M	397	599	24.34	5.32	5	
AUL-WHS	55	9/6/01	M	401	632	42.5	4.47	6	
AUL-WHS	56	9/6/01	M	424	682	44.99	5.72	11	
AUL-WHS	57	9/6/01	M	437	749	31.21	4.56	6	
AUL-WHS	58	9/6/01	M	419	737	61.73	6.16	8	
AUL-WHS	59	9/6/01	M	414	695	40.88	5.03	7	
AUL-WHS	60	9/6/01	M	402	651	45.41	3.65	9	
AUL-WHS	61	9/6/01	M	410	671	36.59	4.13	8	
AUL-WHS	62	9/6/01	M	416	677	26.93	4.78	8	
	mean				415	662.8	32.28	5.14	8.06
	sd				22.0	89.4	11.84	1.12	1.64
	se				4.40	17.9	2.37	0.22	0.33

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
ARP-WHS	14	9/10/01	F	425	776.2	21.23	9.52	8
ARP-WHS	27	9/11/01	F	427	824.7	29.01	13.48	9
ARP-WHS	23	9/11/01	F	446	857.0	24.68	14.39	8
ARP-WHS	26	9/11/01	F	448	1024.3	43.72	12.56	7
ARP-WHS	34	9/12/01	F	448	1043.6	33.46	13.53	8
ARP-WHS	31	9/12/01	F	450	1010.2	47.98	14.41	8
ARP-WHS	16	9/11/01	F	451	915.0	36.68	10.27	6
ARP-WHS	28	9/11/01	F	462	968.6	43.12	15.05	7
ARP-WHS	11	9/10/01	F	470	1129.8	33.81	12.26	9
ARP-WHS	8	9/10/01	F	472	1095.3	44.32	12.58	9
ARP-WHS	3	9/10/01	F	475	1059.7	37.08	13.5	10
ARP-WHS	5	9/10/01	F	475	1185.7	42.12	14.03	10
ARP-WHS	17	9/11/01	F	477	990.1	36.92	15.65	9
ARP-WHS	7	9/10/01	F	480	986.9	30.78	11.01	8
ARP-WHS	32	9/12/01	F	480	972.7	34.29	14.96	8
ARP-WHS	4	9/10/01	F	482	1219.6	37.68	14.55	7
ARP-WHS	30	9/11/01	F	483	1066.4	46.24	12.46	9
ARP-WHS	24	9/11/01	F	491	1125.9	37.3	19.28	8
ARP-WHS	35	9/12/01	F	500	1215.5	44.19	14.29	13
ARP-WHS	33	9/12/01	F	505	1164.4	34.06	19.94	12
mean				467	1028.1	36.93	13.89	8.7
sd				22.1	125.6	7.12	2.53	1.7
se				4.91	27.90	1.58	0.56	0.37
ARP-WHS	39	9/13/01	I	375	579.6	-	6.84	5
ARP-WHS	1	9/10/01	IF	378	551.7	1.99	4.06	7
ARP-WHS	20	9/11/01	IF	383	497.9	1.05	5.11	5

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
ARP-WHS	13	9/10/01	M	350	432.4	16.22	3.3	5
ARP-WHS	15	9/11/01	M	357	474.1	33.18	2.62	5
ARP-WHS	25	9/11/01	M	376	615.1	43.24	7.12	6
ARP-WHS	22	9/11/01	M	384	573.7	46.04	6.15	7
ARP-WHS	9	9/10/01	M	410	700.5	54.82	5.72	5
ARP-WHS	41	9/14/01	M	415	884.5	80.17	9.61	7
ARP-WHS	29	9/11/01	M	416	752.8	81.08	6.58	9
ARP-WHS	21	9/11/01	M	424	788.9	74.7	8.57	8
ARP-WHS	10	9/10/01	M	425	839.1	86.9	7.61	6
ARP-WHS	42	9/14/01	M	426	681.4	90.42	5.94	7
ARP-WHS	2	9/10/01	M	427	815.8	88.08	5.15	9
ARP-WHS	40	9/13/01	M	430	942.3	78.54	9.59	8
ARP-WHS	12	9/10/01	M	436	956.8	78.98	12.53	8
ARP-WHS	19	9/11/01	M	436	900.5	65.29	11.57	10
ARP-WHS	43	9/14/01	M	440	947.7	94.78	7.62	8
ARP-WHS	44	9/14/01	M	442	1015.9	82.59	7.46	8
ARP-WHS	18	9/11/01	M	445	899.6	60.54	7.61	6
ARP-WHS	37	9/13/01	M	445	1017.6	80.05	10.61	8
ARP-WHS	6	9/10/01	M	449	938.8	60.44	8.96	8
ARP-WHS	36	9/13/01	M	467	1005.9	72.81	11.26	10
ARP-WHS	38	9/13/01	M	485	1194.3	92.95	13.31	11
mean				423	824.6	69.61	8.04	7.57
sd				33.3	192.6	20.99	2.84	1.69
se				7.24	41.87	4.56	0.62	0.37

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT g	AGE yrs
WHS-ARY	1	9/17/01	F	480	1249.7	37.4	18.37	12
WHS-ARY	2	9/17/01	F	506	1454.4	58.38	20.51	9
WHS-ARY	3	9/17/01	F	490	1304.8	43.04	15.59	7
WHS-ARY	5	9/17/01	F	520	1629.7	67.92	23.61	8
WHS-ARY	7	9/17/01	F	490	1590.0	54.81	23.64	8
WHS-ARY	8	9/17/01	F	475	1316.1	37.43	19.09	8
WHS-ARY	10	9/17/01	F	490	1240.1	52.46	16.37	8
WHS-ARY	16	9/18/01	F	536	1654.3	72.87	24	12
WHS-ARY	17	9/18/01	F	523	1552.3	63.23	24.4	10
WHS-ARY	18	9/18/01	F	485	1328.9	51.93	22.18	9
WHS-ARY	21	9/18/01	F	470	1204.8	52.65	19.51	9
WHS-ARY	23	9/20/01	F	507	1477.0	54.91	18.57	7
WHS-ARY	24	9/20/01	F	497	1379.4	59.31	19.15	10
WHS-ARY	25	9/20/01	F	490	1353.4	52.42	21.95	10
WHS-ARY	28	9/20/01	F	420	946.9	24.04	11.54	5
WHS-ARY	34	9/20/01	F	500	1522.6	54.75	15.74	10
WHS-ARY	36	9/20/01	F	494	1275.4	44.72	15.36	8
WHS-ARY	38	9/20/01	F	511	1486.8	63.82	21.92	11
WHS-ARY	39	9/20/01	F	509	1489.7	66.76	16.4	8
WHS-ARY	43		F	462	1253.7	44.04		7
mean				493	1382.1	52.8	19.4	
sd				25.0	172.3	11.9	3.6	
se				5.6	38.3	2.6	0.8	
WHS-ARY	12	9/18/01	I	295	260.8	1.06	2.84	
WHS-ARY	13	9/18/01	I	350	449.2	1.23	6.29	
WHS-ARY	14	9/18/01	I	339	461.9	2.26	9.76	

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
WHS-ARY	4	9/17/01	M	462	1183.4	101.94	25.97	10
WHS-ARY	6	9/17/01	M	430	1027.3	77.9	15.07	6
WHS-ARY	9	9/17/01	M	390	758.3	56.12	5.71	7
WHS-ARY	11	9/17/01	M	448	1105.2	60.64	11.73	7
WHS-ARY	15	9/18/01	M	455	1141.3	90.42	13.44	9
WHS-ARY	19	9/18/01	M	428	835.2	82.52	9.7	6
WHS-ARY	20	9/18/01	M	423	887.1	88.87	14.7	8
WHS-ARY	22	9/20/01	M	426	1053.8	81.53	10.29	9
WHS-ARY	26	9/20/01	M	456	1243.3	115.87	19.53	8
WHS-ARY	27	9/20/01	M	454	1138.3	70.42	13.76	8
WHS-ARY	29	9/20/01	M	409	812.4	70.58	8.48	5
WHS-ARY	30	9/20/01	M	438	1046.3	90.39	12.8	9
WHS-ARY	31	9/20/01	M	410	815.7	61.33	8.26	6
WHS-ARY	32	9/20/01	M	402	931.6	83.43	8.77	5
WHS-ARY	33	9/20/01	M	456	1092.4	77.16	11.35	9
WHS-ARY	35	9/20/01	M	442	1069.2	72.13	17.12	8
WHS-ARY	37	9/20/01	M	460	1165.2	90.97	15.53	11
WHS-ARY	40	9/20/01	M	390	719.8	68.6	8.4	5
WHS-ARY	41	9/20/01	M	460	1249.4	114.58	24.96	12
WHS-ARY	42	9/20/01	M	447	1127.0	93.24	15.23	10
WHS-ARY	50	10/23/01	M	430	1008.7	54.24	15.57	7
WHS-ARY	51	10/23/01	M	440	986.0	66.41	11.06	6
WHS-ARY	52	10/23/01	M	424	915.8	59.16	13.35	8
WHS-ARY	53	10/23/01	M	440	1077.2	71.21	16.5	7
WHS-ARY	54	10/23/01	M	435	966.1	69.63	21.45	9
WHS-ARY	55	10/23/01	M	445	1072.8	77.2	16.14	7
WHS-ARY	56	10/23/01	M	434	979.4	68.71	12.7	9
WHS-ARY	57	10/23/01	M	458	986.2	65.65	13.24	10
WHS-ARY	58	10/23/01	M	430	875.6	55.77	10.21	8
WHS-ARY	59	10/23/01	M	430	926.1	75.94	21.71	10
WHS-ARY	60	10/23/01	M	443	1022.6	63.49	16.98	11
WHS-ARY	61	10/23/01	M	435	1023.3	87.35	13.31	9
WHS-ARY	99		M	435	1070.3	76.98		8
WHS-ARY	100		M	434	917.1	76.98		8
mean				436	1006.0	76.05	14.4	
sd					17.9	127.1	15.5	4.4
se					3.7	25.9	3.2	0.9

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
WHS-ALV	4	9/26/01	F	491	1425.0	70.79	24.85	9
WHS-ALV	5	9/26/01	F	473	1182.9	34.89	24.87	7
WHS-ALV	6	9/26/01	F	457	1214.6	56.02	27.06	7
WHS-ALV	8	9/26/01	F	480	1376.0	48.91	15.8	8
WHS-ALV	9	9/26/01	F	470	1032.4	44.64	11.57	5
WHS-ALV	10	9/26/01	F	475	1355.8	54.88	28.89	6
WHS-ALV	12	9/26/01	F	455	1059.1	38.89	11.93	6
WHS-ALV	13	9/26/01	F	470	1301.7	49.58	17.09	6
WHS-ALV	15	9/26/01	F	470	1424.8	75.05	20.9	9
WHS-ALV	17	9/26/01	F	462	1232.9	53.7	14.72	10
WHS-ALV	21	9/27/01	F	425	1070.9	41.81	13.61	7
WHS-ALV	22	9/27/01	F	485	1410.8	58.83	21.1	6
WHS-ALV	23	9/27/01	F	475	1161.5	61.4	17.97	8
WHS-ALV	24	9/27/01	F	440	1040.4	32.49	15.07	7
WHS-ALV	25	9/27/01	F	479	1210.3	58.1	20.65	6
WHS-ALV	26	9/27/01	F	486	1398.5	53	20.08	10
WHS-ALV	27	9/27/01	F	455	1068.2	53.78	13.52	6
WHS-ALV	38	9/27/01	F	454	1334.9	70.16	20.6	7
WHS-ALV	39	9/27/01	F	449	1215.8	51.23	13.81	7
WHS-ALV	40	9/27/01	F	463	1024.3	59.2	16.12	6
mean				466	1223.8	53.4	18.51	
sd				16.5	144.5	11.4	5.07	
se				3.66	32.11	2.52	1.13	

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
WHS-ALV	1	9/25/01	M	416	629.0	85.41	8.1	6
WHS-ALV	2	9/25/01	M	435	938.4	76.14	18.32	5
WHS-ALV	3	9/25/01	M	434	1031.7	103.23	20.21	5
WHS-ALV	7	9/26/01	M	435	889.7	81.45	15.54	6
WHS-ALV	11	9/26/01	M	438	972.1	84.83	8.59	8
WHS-ALV	14	9/26/01	M	435	1123.9	86.52	15.65	6
WHS-ALV	16	9/26/01	M	425	989.2	88.45	5.58	7
WHS-ALV	18	9/26/01	M	445	1100.7	102.65	17.21	6
WHS-ALV	19	9/27/01	M	440	1194.9	81.32	13.02	8
WHS-ALV	20	9/27/01	M	439	1237.6	110.18	13.13	5
WHS-ALV	28	9/27/01	M	425	1000.0	113.35	11.56	8
WHS-ALV	29	9/27/01	M	439	1049.0	93.58	14.33	6
WHS-ALV	30	9/27/01	M	446	1077.6	113.63	13.51	8
WHS-ALV	31	9/27/01	M	455	1202.7	112.57	11.62	8
WHS-ALV	32	9/27/01	M	418	956.8	90.51	9.42	7
WHS-ALV	33	9/27/01	M	422	906.2	84.84	9.21	9
WHS-ALV	34	9/27/01	M	467	1333.4	133.89	19.07	9
WHS-ALV	35	9/27/01	M	415	1110.2	107.71	11.55	7
WHS-ALV	36	9/27/01	M	421	1037.5	95.78	11.26	7
WHS-ALV	37	9/27/01	M	448	1231.7	97.11	12.25	7
WHS-ALV	41	9/27/01	M	450	1093.8	112.42	14.69	6
WHS-ALV	42	9/27/01	M	407	835.4	18.34	9.75	7
WHS-ALV	43	9/27/01	M	451	1044.5	117.05	16.56	7
mean				435	1039.5	95.26	13.05	
sd					14.71	152.2	22.21	3.76
se					3.06	31.71	4.63	0.78

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
WHS-AGI	1	10/5/01	F	390	562.8	19.9	7.55	8
WHS-AGI	3	10/5/01	F	365	453.0	6.8	5.74	5
WHS-AGI	4	10/5/01	F	368	456.6	12.64	4.13	6
WHS-AGI	5	10/5/01	F	376	517.7	22	6.53	4
WHS-AGI	6	10/5/01	F	405	577.0	20.33	7.28	9
WHS-AGI	7	10/5/01	F	412	592.6	21.56	6.41	9
WHS-AGI	10	10/5/01	F	442	784.2	26.53	9.12	8
WHS-AGI	13	10/8/01	F	415	656.4	24.91	7.56	7
WHS-AGI	14	10/8/01	F	415	737.1	34.45	10.09	8
WHS-AGI	15	10/8/01	F	426	741.1	34.49	9.56	8
WHS-AGI	22	10/9/01	F	401	635.5	28.59	8.39	7
WHS-AGI	23	10/9/01	F	442	889.5	38.46	17.54	9
WHS-AGI	25	10/9/01	F	420	773.7	32.58	12.45	9
WHS-AGI	26	10/9/01	F	440	807.3	40.45	13.65	8
WHS-AGI	27	10/10/01	F	472	1051.2	34.59	11.26	11
WHS-AGI	28	10/10/01	F	440	819.2	32.88	10.39	9
WHS-AGI	29	10/10/01	F	465	920.4	34.48	10.92	7
WHS-AGI	30	10/10/01	F	461	845.4	27.58	11.35	9
WHS-AGI	31	10/10/01	F	370	507.3	19.34	5.47	5
WHS-AGI	32	10/10/01	F	432	800.6	30.21	12.92	8
WHS-AGI	33	10/10/01	F	426	691.5	24.78	10.28	9
WHS-AGI	34	10/10/01	F	400	599.8	21.52	9.2	10
	mean			419	704.3	27.1	9.5	
	sd			31.3	160.0	8.4	3.2	
	se			6.7	34.0	1.8	0.7	

LOC.SPECIES	NO.	DATE	SEX	LENGTH	WEIGHT	GONAD WT.	LIVER WT.	AGE
				mm	g	g	g	yrs
WHSAGI	2	10/5/01	M	355	449.0	42.91	3.39	6
WHSAGI	8	10/5/01	M	392	563.8	36.31	4.07	7
WHSAGI	9	10/5/01	M	382	507.7	38.64	4.18	8
WHSAGI	11	10/8/01	M	405	637.3	34.63	5.82	7
WHSAGI	12	10/8/01	M	380	507.0	36.68	4.58	11
WHSAGI	16	10/8/01	M	390	539.0	39.91	5.07	8
WHSAGI	17	10/8/01	M	370	494.5	41.42	5.33	8
WHSAGI	18	10/8/01	M	404	691.9	46.44	5.5	10
WHSAGI	19	10/8/01	M	392	528.2	41.37	5.24	10
WHSAGI	20	10/8/01	M	360	415.7	36.78	3.29	4
WHSAGI	21	10/9/01	M	384	554.1	45.02	5.42	9
WHSAGI	24	10/9/01	M	414	704.3	51.41	7.88	9
WHSAGI	35	10/10/01	M	371	456.9	32.56	3.24	4
WHSAGI	36	10/10/01	M	345	389.4	29	3.12	4
WHSAGI	37	10/10/01	M	321	348.8	26.55	4.67	4
WHSAGI	38	10/10/01	M	348	429.8	28.17	5.29	4
WHSAGI	39	10/10/01	M	415	608.9	31.91	4.23	5
WHSAGI	40	10/10/01	M	353	445.9	29.38	6.11	7
WHSAGI	41	10/10/01	M	353	449.6	27.42	4.52	8
WHSAGI	42	10/10/01	M	358	471.9	31.08	5.3	4
mean				375	506.7	36.38	4.81	
sd				25.4	95.80	6.98	1.15	
se				5.65	21.29	1.55	0.26	

LOC. SPECIES	NO.	DATE	SEX	LENGTH	WEIGHT	GONAD WT.	LIVER WT.	AGE
				mm	g	g	g	yrs
WHS-ALW	1	10/11/01	F	460	865.8	23.99	9.52	10
WHS-ALW	2	10/11/01	F	460	990.9	7.18	9.22	10
WHS-ALW	3	10/11/01	F	480	936.4	32.25	10.97	10
WHS-ALW	5	10/11/01	F	475	984.0	42.91	12.68	9
WHS-ALW	6	10/11/01	F	442	740.5	34.62	7.62	9
WHS-ALW	7	10/11/01	F	474	976.1	38.36	11.03	12
WHS-ALW	8	10/11/01	F	450	891.3	5.83	7.71	9
WHS-ALW	10	10/11/01	F	450	988.3	35.76	15.04	13
WHS-ALW	12	10/11/01	F	471	945.8	35.53	13.21	12
WHS-ALW	13	10/11/01	F	450	943.6	64.46	13.35	15
WHS-ALW	14	10/11/01	F	453	765.9	28.44	8.92	11
WHS-ALW	17	10/11/01	F	437	712.9	6.04	7.39	11
WHS-ALW	25	10/12/01	F	466	933.1	38.52	11.99	11
WHS-ALW	26	10/12/01	F	465	1056.4	38.11	14.31	9
WHS-ALW	35	10/12/01	F	455	938.2	29.62	12.59	7
WHS-ALW	36	10/12/01	F	440	733.6	20.62	9.88	11
WHS-ALW	37	10/16/01	F	455	763.4	30.54	7.98	9
WHS-ALW	38	10/16/01	F	455	768.9	27.18	10.73	13
WHS-ALW	39	10/16/01	F	487	1105.5	48.46	16.99	16
WHS-ALW	42	10/16/01	F	430	767.6	46.97	10.97	9
WHS-ALW	43	10/16/01	F	475	957.2	39.86	10.33	9
WHS-ALW	44	10/16/01	F	445	929.4	46.41	12.3	9
WHS-ALW	46	10/16/01	F	460	877.4	39.86	9.44	11
mean				458	891.2	33.11	11.1	
sd				14.6	110.4	14.0	2.5	
se				3.0	23.0	2.9	0.5	
WHS-ALW	16	10/11/01	IF	450	869.0	5.06	8.24	9
WHS-ALW	18	10/11/01	IF	432	737.3	4.47	6.92	11
WHS-ALW	21	10/12/01	IF	460	745.1	3.86	6.5	10
WHS-ALW	23	10/12/01	IF	437	799.8	4.75	6.46	9
WHS-ALW	9	10/11/01	IM	427	735.9	5.15	6.61	8

LOC. SPECIES	NO.	DATE	SEX	LENGTH mm	WEIGHT g	GONAD WT. g	LIVER WT. g	AGE yrs
				0.0				
WHS-ALW	4	10/11/01	M	380	533.5	37.37	5.19	7
WHS-ALW	11	10/11/01	M	392	638.2	36.91	4.89	9
WHS-ALW	15	10/11/01	M	389	619.8	41.67	6.07	10
WHS-ALW	19	10/11/01	M	345	417.6	28.7	2.94	5
WHS-ALW	20	10/12/01	M	410	568.5	23.34	4.56	9
WHS-ALW	22	10/12/01	M	415	726.8	33.66	6.2	8
WHS-ALW	24	10/12/01	M	395	662.5	43.18	6.69	9
WHS-ALW	27	10/12/01	M	398	598.4	37.02	5.78	10
WHS-ALW	28	10/12/01	M	425	805.1	42.55	8.6	11
WHS-ALW	29	10/12/01	M	405	692.7	39.29	6.89	8
WHS-ALW	30	10/12/01	M	412	813.3	51.22	8.18	8
WHS-ALW	31	10/12/01	M	420	861.8	45.2	16.7	10
WHS-ALW	32	10/12/01	M	415	684.0	44.08	7.09	10
WHS-ALW	33	10/12/01	M	420	743.1	55.14	6.95	10
WHS-ALW	34	10/12/01	M	395	663.5	34.71	6.51	9
WHS-ALW	40	10/16/01	M	400	580.9	36.78	4.76	7
WHS-ALW	41	10/16/01	M	400	622.0	30.78	5.21	8
WHS-ALW	45	10/16/01	M	408	778.1	53.9	9.23	11
WHS-ALW	47	10/16/01	M	405	669.6	44.9	5.73	10
WHS-ALW	48	10/16/01	M	385	491.5	43.4	3.68	8
mean				401	655.6	40.2	6.6	
sd				17.9	111.7	8.1	2.8	
se				4.0	24.8	1.8	0.6	

raw steroid data

STATION	KTM pg/ml	TM pg/ml	TF pg/ml	E2F pg/ml	MFO F (pmoles/min*mg)	MFO M (pmoles/min*mg)
AUL	3180	830	1704	1388	2.83	5.38
AUL	1257	811	731	1264	3.43	6.36
AUL	3126	939	113	146	1.98	12.01
AUL	3872	1204	656	1271	3.40	11.61
AUL	1878	757	241	343	0.46	10.89
AUL	2004	839	410	611	3.69	8.39
AUL	3042	1255	398	527	5.45	14.66
AUL	1182	460	290	489	9.96	2.57
AUL	1974	696	577	938	2.32	15.48
AUL	3012	1329	339	362	5.05	10.40
AUL	3686	1354	947	896	5.91	4.56
AUL	2382	779	658	1008	5.35	17.76
AUL	3096	845	485	539	5.58	13.35
AUL	2400	982	723	892	1.28	5.49
AUL	1848	688	175	178	2.30	10.92
AUL	1939	761	1344	1789	3.00	7.49
AUL	2596	864	432	454	2.56	4.42
AUL	2083	716	540	767	5.47	10.27
AUL	1409	513	965	1447	6.29	8.02
AUL	628	504	260	542	5.99	5.17
ARP	516	502	252	163	0.78	1.06
ARP	114	344	555	538	1.95	1.68
ARP	321	487	426	884	3.99	2.56
ARP	1040	852	419	411	1.11	1.60
ARP	305	558	201	331	1.47	1.04
ARP	312	390	286	483	1.58	1.08
ARP	380	482	213	410	1.26	10.71
ARP	2285	651	1033	1437	3.82	7.68
ARP	1717	686	879	1037	3.01	11.75
ARP	2519	597	508	798	3.69	21.87
ARP	5893	1634	1264	1237	3.98	19.56
ARP	2550	837	1733	1744	2.74	11.29
ARP	3181	926	630	1136	10.17	21.86
ARP	4388	1239	1422	1414	2.87	5.50
ARP	2519	865	1468	1615	2.58	6.10
ARP	2218	741	2174	1956	3.63	9.24
ARP	572	389	1374	1606	2.51	13.73
ARP	3423	1119	1223	1430	1.34	8.59
ARP	4025	1400	1034	1366	2.54	8.63
ARP	1377	609	399	597	2.04	11.34

STATION	KTM pg/ml	TM pg/ml	TF pg/ml	E2F pg/ml	MFO F (pmoles/min*mg)	MFO M (pmoles/min*mg)
ARY	4621	1534	1818	187	1.39	8.19
ARY	485	304	1659	2589	2.86	29.18
ARY	5128	1435	1420	1748	3.71	6.92
ARY	1007	591	525	2271	2.18	6.70
ARY	732	349	2254	2259	2.78	4.97
ARY	238	327	2892	2892	2.86	7.34
ARY	1682	627	1446	2876	2.74	11.11
ARY	1658	935	440	1321	2.03	26.59
ARY	3669	1100	593	1872	1.80	16.00
ARY	2263	629	1533	2098	1.86	12.30
ARY	3010	610	3670	3921	3.36	13.31
ARY	5842	2105	357	962	3.02	32.24
ARY	8213	2135	401	737	2.37	27.81
ARY	4027	1023	920	2082	3.12	13.88
ARY	4479	997	254	433	3.86	11.10
ARY	4085	959	236	395	1.38	8.82
ARY	3595	837	303	764	1.34	10.32
ARY	6709	1928	470	1899	2.91	53.51
ARY	7769	2221	392	801	2.20	12.04
ARY	9600	3003	309	578	6.24	28.83
ALV	496	400	249	765	2.27	8.07
ALV	2073	921	1320	1649	3.14	23.57
ALV	698	611	605	1118	4.05	7.74
ALV	2230	1437	262	519	1.73	5.11
ALV	1885	738	357	451	2.44	16.94
ALV	1301	797	500	975	2.88	5.59
ALV	1334	988	331	480	1.62	8.73
ALV	895	793	304	620	2.22	18.19
ALV	2106	941	556	1067	2.16	10.83
ALV	1420	704	565	790	2.78	13.13
ALV	336	315	375	495	4.35	11.82
ALV	422	400	459	656	1.84	21.18
ALV	741	673	366	776	2.04	13.06
ALV	676	499	1285	1606	5.14	8.18
ALV	677	657	355	852	2.50	7.22
ALV	735	714	340	674	1.95	8.42
ALV	837	549	606	349	1.05	13.03
ALV	1473	784	664	1141	0.98	8.29
ALV	953	665	313	251	1.38	9.53
ALV	628	461	1036	991	1.46	11.08
ALV	4771	1426	.	.	.	10.70
ALV	5559	1429	.	.	.	9.69
ALV	2234	1177	.	.	.	14.63
ALV	736	431

STATION	KTM pg/ml	TM pg/ml	TF pg/ml	E2F pg/ml	MFO F (pmoles/min*mg)	MFO M (pmoles/min*mg)
AGI	4008	1925	622	604	2.91	13.45
AGI	1889	931	343	497	7.04	6.98
AGI	2477	1268	1183	2242	1.91	12.16
AGI	4141	1919	667	719	3.98	9.92
AGI	6150	2306	626	871	1.61	11.13
AGI	2727	1108	656	1142	1.48	9.64
AGI	3499	1150	870	1116	1.63	4.65
AGI	3146	1437	1187	1500	2.08	12.76
AGI	3151	1421	135	397	6.84	6.82
AGI	3209	1632	1278	1458	1.41	7.80
AGI	4158	1113	1590	2377	2.95	5.10
AGI	5424	1875	1246	2036	2.34	30.68
AGI	6606	2589	1755	2410	4.32	13.14
AGI	3205	1188	616	631	3.22	8.52
AGI	4496	1611	1144	1395	3.12	14.22
AGI	3679	1341	648	876	2.16	43.16
AGI	4394	1256	441	864	1.93	16.36
AGI	5833	1842	469	713	1.04	36.38
AGI	4282	1402	497	1004	2.77	12.50
AGI	2327	967	740	748	2.71	10.96
AGI	.	.	1294	1693	1.50	
ALW	3984	1194	144	114	3.95	5.31
ALW	2572	777	734	125	2.86	25.34
ALW	2337	833	705	1047	1.82	7.71
ALW	1516	663	456	1740	1.62	2.41
ALW	280	217	667	1203	1.98	1.70
ALW	2665	656	54	1339	2.22	6.22
ALW	2616	838	1013	182	9.16	11.96
ALW	1710	658	912	1980	4.73	15.38
ALW	1821	596	178	1665	3.28	20.46
ALW	2724	751	604	1867	1.98	19.32
ALW	2866	694	772	1017	2.61	5.06
ALW	3766	1159	138	89	3.43	8.74
ALW	2163	549	367	717	3.65	9.99
ALW	2680	732	371	928	2.28	10.50
ALW	1929	467	418	597	1.52	3.18
ALW	1504	657	476	858	1.56	9.40
ALW	1904	573	626	1335	2.67	14.47
ALW	5300	1367	631	709	2.34	10.08
ALW	2289	1130	1414	952	1.91	2.03
ALW	1555	806	688	2154	1.47	
ALW	.	.	538	394	1.77	
ALW	.	.	1135	1322	1.64	
ALW	.	.	927	1308	0.93	

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AMBIENT BIOLOGICAL MONITORING

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